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WE GUARANTEE, that of this issue 10,800 copies were printed; that of those 10,800 copies, 9,869 copies were mailed or delivered by messenger to regular paid subscribers; 750 copies were distributed among members and guests of The Railway Signal Association and at the Coliseum; 131 copies were mailed to advertisers; and 50 copies were set aside for office use.

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The number of Signal Association committees is increasing gradually from year to year as various subjects connected with signaling assume importance enough to warrant their study by separate committees. At the same time the reports are not decreasing much, if any, in length, and the number of meeting days in a year has probably reached its maximum under existing conditions. The result is that better use has to be made of the six available meeting days. Accordingly, this year some of the committee reports are presented for such final action at this meeting as will not require them to be submitted again until the annual convention next October. They will skip the June meeting altogether. This plan was followed to some extent last March. It is a decided improvement over the old way of letting the committees report progress at each of the stated meetings, which, in most cases has resulted only in doing over again in June a considerable part of what had already been done in March. Under the new plan about half the committees can get, at the March meeting, as much discussion as their reports need before the final presentation in October. And in June the rest of them can do the same.

The answer to the question, "Who will be who in the signal business five years hence?" is to be found in the futures of the young men. Upon them depend the future of the Railway Signal Association and the future of the signal business. It is highly gratifying, therefore, to see so many of them taking an active interest in the work of the association. There is a comparatively large number of new faces among the committee members and several among the committee chairmen. R. C. Johnson and R. B. Elsworth, both assistant signal engineers of the New York Central, E. G. Stradling, signal engineer of the Monon, and W. N. Manuel, signal supervisor of the Grand Rapids & Indiana, are the newest among the latter, and all of them are doing good work. Nobody gets paid in real money for his loyalty to a voluntary association of this kind, nor for his work on the committees, which often requires a great deal of time and a vast amount of painstaking effort. But the work itself has a double benefit. It secures greater opportunities for preference in the association, for responsibilities naturally gravitate to those who show themselves capable of carrying them. And at the same time, by attracting the attention of signalmen all over the country, it advertises individual ability in a way that even a strict interpretation of professional ethics would have no quarrel with.

Manufacturers in general, and a good many members of the Signal Association, seem to have a wrong idea as to the significance of a favorable vote on matters that are brought before the stated meetings and the annual meeting of the association. For example, there is a growing feeling that if a design or a set of specifications receives a favorable vote

at any meeting, this vote represents the approval of the organization; and it is generally considered that whatever was thus voted upon has become the standard practice of the association. As a mater of fact the R. S. A. constitution provides that nothing can be adopted as the standard practice of that body until it has been approved by letter ballot by two-thirds of the members and representatives; and no proposition can be submitted to letter ballot until after it has been presented at an annual meeting, and ordered submitted by a majority vote of those present. In other words, the annual meeting of the association is the only one that can pass upon a standard, and even its power to do this is limited, as it can do no more than order the proposition submitted to letter ballot. The discussions at stated meetings are in the nature of considerations of the various subjects by the members as a committee of the whole, and whatever votes they may take, or whatever actions they may decide upon, amount to nothing more than an expression of the approval or disapproval of the committee of the whole on the work of the particular committee. It is a long process to get anything approved by the R. S. A.; and manufacturers who may desire to make apparatus to conform to standard specifications should refrain from making the extensive changes that are often necessary in previous designs, until they are certain that the apparatus in question has received not only the favorable votes at the meetings, but also the approval by letter ballot which alone can make it the standard and approved practice of the association. And, at that, "there's many a slip" between a favorable vote at a stated meeting and a favorable vote by letter ballot, as a number of the committees have found.

THE COMMITTEE REPORTS.

The committees that submitted reports at yesterday's meeting were the same as last year with the exception of two—those on Contracts and Automatic Block Signaling. These were not represented in the list of reports, the committee on Manual Block and the Special Committee on Methods of Recording Signal Performance having taken their places.

The reports this year were more carefully compiled and in better shape than in some previous years, principally for the reason that the new manual was available as a guide in making the specifications in practically their finished form to start with. An additional reason for the improvement is the fact that it is not intended that some of the reports shall receive any further discussion before they are submitted for final approval at the annual meeting. This is particularly true of the work of Committee V on Manual Block, which is probably the most complete of all the seven that were discussed. It goes deeply into the matter of rules, paying special attention to the elimination of hand signaling at interlocking plants and providing as a substitute the use of a caution card.

Another matter of interest covered in the revised rules of Committee V is the prevention of fires. It usually happens that interlocking stations which are built of wood are located at the most isolated points, while those that are constructed of brick or concrete stand in the midst of municipal fire fighting facilities. This makes the fire menace a serious matter. The committee would add it to the signalman's list of things to look out for and guard against.

New rules were submitted for signal supervisors, signal foremen and also for maintainers, there being five times as many for the latter to become familiar with as for either of the other two. The most difficult to obey of all the maintainers' half-hundred will undoubtedly be the rule that requires the maintainers to "know that section foremen understand that new rails should not be put in or electric connections broken without facilities to restore promptly the working order of the signals" when rails are bonded for an electric circuit. It implies not only that the maintainers must know that the section foreman knows, but also that he must see to it that the section foreman knows and likewise that he does as he knows—which is a matter of great difficulty.

The Committee on Wires and Cables submitted specifications for a class of material which is rapidly going out of style. A wire connected signal is rarely installed nowadays.

Mr. Elsworth's committee on Storage Battery and Charging Equipment presented an interesting summary of the principal facts concerning the use of Edison storage batteries for automatic signaling. This part of the report was written by G. E. Beck, signal supervisor of the Lake Shore, and is submitted merely as information, the committee's specifications having been confined to lead type stationary storage battery for automatic signaling.

THE SIGNAL ASSOCIATION.

The stated meeting of the Signal Association began at 9:30 o'clock, the appointed hour, yesterday morning. This is the first time a March meeting has been "on time" in several years. The attendance at the start was considerably better than last year, and at noon, when it had reached its height, was larger than at any previous meeting for a long time, and considerably in excess of that at some of the recent annual conventions.

The subjects taken up during the morning hours were the specifications proposed by the sub-committees of the Power Interlocking Committee. They were passed for the most part without much discussion. The principal objection advanced was that the specifications for train drops, annunciators and bells should not exclude apparatus which is now used in connection with telephone engineering practice. The general form of the specifications was such that commercial apparatus would be excluded if they were adopted, and it was the general consensus of opinion that the committee should go further into the matter and make provision for the use of this kind of apparatus in cases where signal engineers might decide that it was cheaper or better than apparatus which had to be especially made to conform to the specifications.

The second committee report was that on Manual Block. The discussion centered about the substitution of caution cards for hand signaling at interlocking plants. In order to sound out the feeling of the members on the subject, a resolution that the caution card be used in addition to hand signaling was offered, and after considerable argument for and against, was adopted by a small majority. The discussions on the manual block report were interesting, and some of the opinions expressed might have been carried further with benefit to those on both sides of the argument, had there been time.

The third report to be considered was that by Mr. Mock's committee on Standard Designs. The designs were accepted for the most part without much discussion, a few of them being referred back to the committee. The committees on Alternating Current Signaling, on Wires and Cables, and on Storage Battery and Charging Equipment "marched up the hill and then marched down again," as it were, only a few moments being given to the reports of each of them.

The last report, that of Mr. Manuel's committee on Method of Recording Signaling Performance, took up considerable time at the end of the meeting. The discussions were on the various forms presented, and they were illuminating and helpful to the committee.

Altogether, the meeting was one of the most successful that the association has had for some time, and it is to be

congratulated, both upon the interest shown by the individual members of the committees in their assignments, and the good start they have made toward an effective disposal of the large amount of work they have assumed this year.

KEEPING TAB ON THE SIGNALS.

Mr. Manuel's committee, on Methods of Recording Signal Performance, has made a fine start, particularly in the matter of finding a standard basis for computing the efficiency of signals. There are now almost as many schemes for keeping track of what signals do as there are kinds of bootlegs—that is to say, almost as many as there are railroads. In the absence of any concerted effort to establish a uniform basis, each road has been left free to make an arbitrary selection. The committee has gathered together a good many of these arbitrary bases, and finds "considerable detail with no semblance of uniformity." It has gone ahead, nevertheless, with the effort to formulate a system that will be acceptable as a standard "medium of exchange" where the efficiency of apparatus has to be taken into account, either in the relations between different roads or between signal departments and signal companies.

One road's contract specifications already require a guarantee of 25,000 operations per failure, and another puts the figure at 18,000. The committee's basis of 15,000, while it is exceedingly conservative, may by implication, at least, fail to reflect as much credit on the signal mechanisms now available as they deserve. A higher figure might be more creditable by indicating their ability to meet a more rigorous requirement.

A standard basis of computing efficiency will give most signal departments a better means than they now have of keeping their operating forces in touch with what the signals are doing, and in addition it will establish such a common standard for recording signal performances as will enable signaling information to be disseminated to the public in a more understandable form. The interest of the public in safety matters is increasing. And it is possible that no large part of its interest in automatic stops—which are not in use—has grown up simply because it was permitted to do so as a result of the absence of any effort to arouse interest in the signal devices that are in use. These, having been tried out and found satisfactory, ought to have much more interest for the public than something which has not yet had an opportunity to prove up except in a few special situations. The fact that signals are not more interesting to the public is due as much as anything to lack of publicity. Every effort to explain signals and signaling in words of one syllable helps to make more publicity possible.

THE NEW SIGNAL MANUAL.

The first edition of 530 copies of the Signal Association Manual, which were published last year, has been entirely exhausted and there is a demand for a considerable number of extra copies. Two hundred more copies will be printed; meanwhile so much new material has been developed that it will be necessary to increase the book, which is published in loose leaf form, from 614 to 800 pages. It is estimated that the additional copies of the original manual will cost about $1200 and that the 200 new pages which will be published can be furnished to the members at about one cent a sheet.

Another revision of the manual will probably not be made within the next three years; such additions or revisions as may be made in the meantime will be referred to in the proceedings until it is found advisable to publish a new edition.

PROGRAMME OF AMERICAN RAILWAY ENGINEERING ASSOCIATION.

The following is the programme for the convention of the American Railway Engineering Association. The programme is subject to change by a two-thirds vote of the convention or by time required for consideration of reports.

Morning Sessions—9:00 a. m. to 12:30 p. m.
Afternoon Sessions—2:00 p. m. to 5:30 p. m.

Tuesday, March 18.

President's Address.
Reports of Secretary and Treasurer.
Reports of Standing and Special Committees.
XII. Rules and Organization.
X. Signals and Interlocking.
XV. Iron and Steel Structures.
V. Track.
IV. Rail.
Reception at 8:00 p. m. by Board of Direction to members and guests.

Wednesday, March 19.

XVI. Economics of Railway Location.
VII. Wooden Bridges and Trestles.
Special. Uniform General Contract Forms.
XVII. Wood Preservation.
III. Ties.
IX. Signs, Fences and Crossings.
VIII. Masonry.
Annual Dinner at 7:00 p. m.

Thursday, March 20.

XIX. Conservation of Natural Resources.
II. Ballast.
VI. Buildings.
VIII. Water Service.
XIV. Yards and Terminals.
Special. Grading of Lumber.
I. Roadway.
XVIII. Electricity.
XI. Records and Accounts.
New Business.
Election and Installation of Officers.
Adjournment.

Friday, March 21.

Visit to National Railway Appliances Exhibition in the Coliseum and Armory.

THE SPEAKERS AT THE ANNUAL A. R. E. A. DINNER.

The annual dinner of the American Railway Engineering Association will be given in the Gold room of the Congress hotel on Wednesday evening, at 7 o'clock. The speakers will be B. A. Worthington, of Chicago, president of the Chicago & Alton; George A. Post, of New York, president of the Railway Business Association; Rev. R. W. Dickie, of Montreal, Canada, and P. G. Rennick, of Peoria, Ill. Mr. Worthington will speak on Looking into the Future; Rev. Mr. Dickie on Internationalism, and Mr. Rennick on the Twentieth Century Pattern.

UNIFORM BLOCK SIGNAL LAWS HEARING.

The railway commissions of Illinois, Indiana, Wisconsin and Minnesota, by a committee of their representatives, held a final hearing on the subject of the proposed uniform block signaling laws for steam and electric railways in those states, on March 12, in the offices of the Illinois Railroad and Warehouse Commission in the Insurance Exchange, Chicago, F. G. Ewald represented the Illinois commission; D. F. Jurgensen,

the Minnesota commission; J. N. Bidwell and E. J. Larson, the Wisconsin commission, and H. O. Garman, the Indiana commission. The signal engineers of all the roads in the four states mentioned were present; and although this hearing was to have been the last one before the recommendations were brought before the various commissions to their state legislatures, there were a number of suggestions made by the signal engineeers present which it was thought advisable to take into further consideration. For that reason the hearing was not considered conclusive; and it is probable that another hearing will be held at a later date after the suggestions have been embodied in the proposed uniform rules. This matter has been under way for several years and the committee of representatives of the four commissions named have spent considerable time in investigations of, and hearings concerning, up-to-date practice in signaling and interlocking on both steam and electric railways.

RESOLUTION REGARDING THE LATE J. C. YOUNG.

At the morning session of the Railway Signal Association F. P. Patenall offered the following:

"The sad news of the sudden death of J. C. Young having reached the members of the association but a few weeks before this meeting, the following minute is offered to be spread upon the record of the meeting and a copy to be sent to his family:

"James C. Young, member and director of the Railway Signal Association and signal engineer of the Union Pacific, died on February 25, 1913. By this minute we express the feeling of loss to the association and to those connected with him in his work, which his death has occasioned, and tender to his mother and sister our profound sympthy. We hope that the memory of his upright and useful life as a gentleman and a railroad officer will be of as much comfort to his mother and sister, as it is an example to his friends and associates."

The members stood and the minute was adopted in silence.

RECEPTION AND ADDRESS BY WILLIAM McNAB THIS EVENING.

The board of direction of the American Railway Engineering Association will give a reception to the members and guests of the association in the Gold room of the Congress Hotel this evening at 8 o'clock. After the reception William McNab, principal assistant engineer of the Grand Trunk, and a past-president of the association, will deliver an address on the Panama Canal. Mr. McNab made a visit to the canal a short time before last year's convention, but has since kept closely informed regarding developments there. His address will be illustrated with stereopticon views secured from the authorities at Washington.

ANNUAL MEETING; RAILWAY APPLIANCES ASSOCIATION.

The annual meeting of the National Railway Appliances Association for the election of officers and the transaction of such other business as may come up will be held in the ballroom of the Coliseum annex on Tuesday at 11 a. m.

NEW R. S. A. BOARD MEMBERS.

W. H. Elliott, signal engineer, New York Central & Hudson River, was elected to the Board of Direction of the Railway Signal Association, at the board meeting on Sunday, March 16, to fill the unexpired term of J. C. Young, signal engineer of the Union Pacific, who died February 27, 1913.

Proceedings.

The stated meeting of the Railway Signal Association was called to order at 9:30 a. m. on Monday, March 17, in the Florentine room of the Congress Hotel, Chicago, by President B. H. Mann, signal engineer of the Missouri Pacific.

POWER INTERLOCKING.

The committee submitted specifications for annunciator bells push buttons for bells, train drops, etc., floor pushes, and fuses, asking for full discussion so that the complete reports on these subjects can be presented for final consideration at the annual convention at Nashville in October. The specifications for fuses include a diagram of dimensions for cartridge enclosed fuses.

Sub-committee "C," of which I. S. Raymer, assistant signal engineer, Pittsburgh & Lake Erie, is chairman, was instructed to prepare plans for wire ducts, terminal boxes, and manholes. The time of this sub-committee since its appointment has been given to drawing up specifications for steel and iron pipe conduit and the collection of data covering the field work for the installation of wire ducts. The specifications for steel pipe conduit and wrought iron pipe conduit were submitted at this meeting.

The committee consists of R. C. Johnson (N. Y. C. & H. R. R.), chairman; F. B. Wiegand (L. S. & M. S.), Burt Anderson (A. T. & S. F.), W. H. Arkenburgh (Union Switch & Signal Co.), M. H. Collins (H. & M.), J. R. Decker (M. C.), A. B. duBray (Frisco), B. B. Gray (P. L. W.), W. H. Harland

ROBERT C. JOHNSON,
Chairman Committee on Power Interlocking.

(N. Y. O. & W.), H. H. Harman (B. &. L. E.), E. C Hitchcock (N. Y., N. H. & H.), L. E. Kinch (P. R. R.), M. H. Loughridge (N. Y. W. & B.), J. W. MacCormack (K. C. T.), W. N. Manuel (G. R. & I.), G. A. Motry (B. & O.), H. H. Orr (C. & E. I.), F. W. Pflegling (U. P.), A. B. Pollock (P. R. R.), W. M. Post (P. R. R.), I. S. Raymer (P. & L. E.), D. W. Rossell (N. Y. C. & H. R.), T. C. Seifert (C. B. & Q.), F. G. Smith (C. & E. I.), O. R. Unger (M. P.), G. A. Ziehlke (U. P.).

Discussion on Power Interlocking.

The report of the sub-committee A was read by A. B. du Bray, chairman, by paragraphs.

T. S. Stevens (A. T. & S. F.): Has due consideration been given to the advisability of using some other contact material than platinum in annunciator bells?

Mr. du Bray' We considered most of the contact materials and decided that platinum best served our purpose.

Mr. Stevens: Is it really necessary to specify that the coils of the annunciators shall be in accordance with association specifications? The association's specifications for coils, as now designed, are intended for use in instruments of far more importance than annunciator bells. The question arises as to whether we are not saddling an undue expense on the railroads by this clause in specifications. In paragraph 1-K, Binding Posts, Nuts, Washers, etc., are specified

in accordance with Railway Signal Association drawing 1070. Has due consideration been given to the fact that this will increase the size of annunciator bells and material, and therefore possibly increase their cost unduly?

The Chairman: We decided we would get the best results by having four coils, and as long as we were going to have four coils we thought it best to live up to the balance of the relay specifications with reference to coils. With reference to paragraph K, we frequently have heavy wires on those binding posts, and we thought we would better have the standard posts.

Mr. Stevens: That will be all right as soon as we have developed a line of material which will comply with these specifications. At first it will knock out all commercial annunciator bells.

The President: We realized in the committee that, as far as we knew, there was nothing on the market that would pass these specifications, but we did not see why there was any reason it should not be made to cover the specifications.

W. N. Manuel (G. R. & I.): I suggest the diameter of the screws be mentioned, and, under "contacts," I suggest that the area of the contacts be specified, for the reason that with the bells we are using now the contacts are very frequently punctured by the short contacts. I believe the bells would give better service and would be of longer life.

A. G. Shaver (C. R. I. & P.): It seems to me that the specification on annunciator bells is too much in detail in some respects. For example, a nickel-plated gong is specified, and again pressed steel cover; the current requirement is stated in amperes for certain resistances of bells and it is arranged to allow those being put in by the purchaser. I should think it would be a good plan to specify the energy that a bell must work with, and if done in that way, then, as certain types of bells require the same amount of energy, regardless of what the resistance might be, we would not need to bother about stating the current every time we wanted to order a bell. In section 2, paragraph (b) I think is wrongly stated.

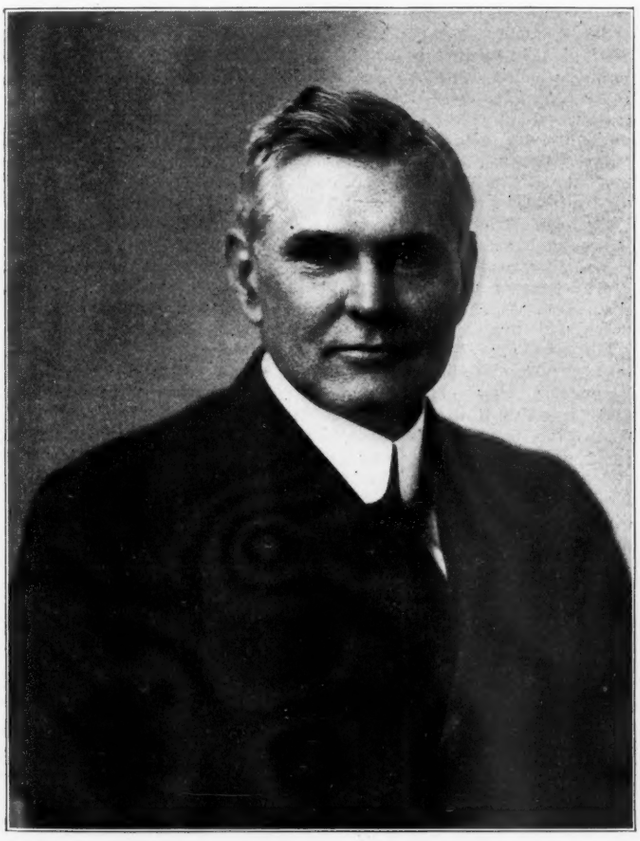
J. C. Mock (M. C.): I understand that the paragraphs in the specifications for push buttons, train drops, etc., relating to annunciator bells should be similar for each specification. Does this one permit the use of outfits such as telephone companies use, or will your specifications make the instruments so large that they will cut out all of that standard telephone equipment? Will the telephone people be able to supply it?

The Chairman: Not from material they have in stock at present.

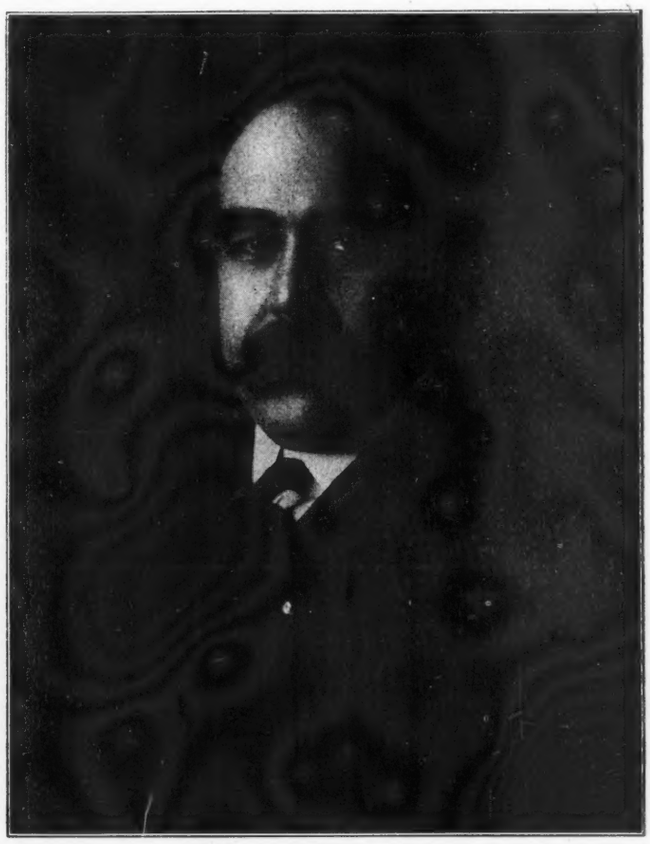
Mr. Stevens: I think the question I raised and the question Mr. Mock has raised is a rather serious one, and one which this convention will have to consider seriously at the annual convention. We are practically cutting out commercial material of all kinds and specifying something which will have to be developed, without any possibility of checking the price. I doubt very much whether the material we are specifying warrants the rigid specifications we are attempting to put before the association.

Mr. Shaver: I am in sympathy with that same line of argument. It seems to me the specifications are pretty rigid and go too much in detail.

The Chairman: We considered that quite a long time in committee meetings and decided that we would make specifications which, in our estimation, were A-1, and that if anybody wanted to put in some cheaper apparatus, that they could put in something that was now on the market. If they wanted to put in a first class proposition they could specify R. S. A. specifications.



B. H. MANN, President.



F. P. PATENALL, Vice-President.

C. E. Denney (L. S. & M. S.): I believe the question would be satisfactorily covered if the specifications, after approval, are referred to the committee on standards to design a push button. The price will be lower by making it a standard article.

Mr. Mock: I would suggest that the committee be asked to draw a specification which would permit the use of any high grade equipments, such as the telephone companies now supply. The telephone companies are making very good and very compact designs. I have not the slightest notion that the standards of the committee can improve on them for the use of signal work; if you tell us that we must have a standard R. S. A. binding post and ⅜-in. air gap, you have practically settled the question of size. I think it is quite a serious matter now in all our big plants to provide the room for these appliances.

A. H. Rudd (Penn.): Could not the heading of these specifications be changed so as to show that they shall apply only to certain work; for instance, the bell is provided with a ⅜-in. air gap, and that is the same as the air gaps which

are required to protect against lightning troubles, etc. The practice on many roads is to place these annunciator bells on a local circuit right in the cabin, and there is no chance of lightning getting at them, and in that case a cheaper bell could be used. I think the same remark applies to the specifications for annunciators and push buttons. It seems to me that if a specification could be divided so that while it does specify for the best class of material, which is to be used on certain kinds of work, where they either have circuits of high voltage or where they have circuits exposed to lightning, and this better grade of material was to be used in such cases, yet other grades of material could be used in cases where the conditions were not so exacting, and then that would give us a chance to use cheaper material on the inside and local circuits, which would serve the purpose.

Mr. Shaver: I move that the committee consider the specification with regard to revisions, such revisions as may be necessary, in view of what has come up at this meeting.

Mr. Stevens: I second the motion. I know that we will not use these specifications. We do not think the specification as provided for this type of apparatus is necessary. Mr. Mock has raised a very clear fact that all our communications with each other through the medium of the telephone are made with these identical articles which we are trying to specify here, and the telephone company has developed these things into the smallest possible articles they can get hold of, and they work. Why should we design a great big piece of apparatus, probably expensive—we cannot tell that until it is developed—to do the same work the telephone people are doing with probably a cheaper instrument, at least one of far less bulk?

L. S. Rose (C. C. & St. L.): I think the committee is right. The cost of these articles and the maintenance of them should be taken into consideration. When the telephone company wants to make a change they put in a new machine, and it has been our practice, when we have a coil burned out of a bell, to put in a new bell. If we can get a form of wound coil we can repair the bell, by putting in a new coil, and save the rest of the bell, and as far as our R. S. A. standard binding posts, nuts, etc., are concerned, we will have a lot of these parts on the railroads, with which to repair our machines, and everything will not be special. I think that the committee is on the right track.

After these specifications have been in use a little while you will find that all the supply houses will be making these patents of push buttons, annunciators, etc., without these specifications, and we will have a better chance to judge whether we are getting our material for the right price or not, where now we take some special design, and we do not know whether it is economical, because we cannot compare it with anything else. I sustain the committee.

J. Beaumont (C. G. W.): There is no compulsion as to using this material in places where possibly somewhat inferior apparatus would fill the conditions, but the work of the R. S. A. is based on the theory that we want the best material to fit certain conditions, and these conditions are taken care of by such apparatus as are developed from the work of its committees. I move, as an amendment to the original motion, that the specification be accepted by the Association.

T. S. Stevens: It is not a question of always using the best. It we can use apparatus which is being used now on the train dispatching telephone service throughout the country, surely it is good. I am arguing in favor of commercial material that is good, and is on the market, and that has been the process through which this association has got up all its specifications, basing it first on something that is commercial and gradually developing the thing to a higher point, if they find it necessary in the case of this commercial material.

(The president then put to vote the amendment motion, which was not carried, and the original motion to recommit the matter to the committee was then put and carried.)

Mr. Du Bray: The next is the specifications for floor pushes.

W. H. Elliott: I suggest a modification of the clause (e) I think it might be expressed more clearly as follows: "Floor push shall be mounded on the underside of the floor with operating button raised a sufficient distance above the top of the floor.

Mr. Du Bray: We will accept that.

Mr. Stevens: I move that the section, "Specifications for Floor Pushes," be accepted with the same consideration that applied to the previous paragraph.

Mr. Shaver: I ask the committee why in Section 1, in paragraph (h), it should not be arranged so that there may be a normally open contact or a normally closed contact? While I am aware that in most cases a normally open contact is desirable, yet in some cases a normally closed contact is desirable. I want to call attention to paragraph (b) in Section 2, on "Testing." I find too many of us in preparing specifications are not careful about the inspection clause. A floor push is not a very expensive piece of apparatus, and I am not so sure it is going to pay us to send an inspector to look over ten floor pushes at the place of manufacture. The same applies to other apparatus of such a nature, and I believe it should be stated in such a way that we are not obligated to send someone to inspect ten or more push buttons if we do not want to do it. The expense of sending a man to make these inspections will oftentimes equal the cost of the apparatus.

The President: The committee is willing to change the word "will" to "may."

The motion was then carried.

Mr. Du Bray: The next specification which we desire to bring up is that for fuses. Before we get into this I would like to say that the drawing as shown on page 10 is not quite right. The note, "Dimensions of Above Type to Be Specified by Purchaser," applies only to the screw contact fuse and not to the ferrule contact type. The fuse covered by the National Code specifications will meet the specifications here, and there is nothing in these specifications that will make an article special for signad use. It is in accordance with the National Code; in fact, a great deal of this matter is copied directly from the Code, and the balance of it is more or less of a rearrangement of the Code specifications. In some cases we have limited the capacities to what we think is necessary in signal work and cut out all other fuses.

Mr. Stevens: I suggest an asterisk with a footnote saying at the bottom, "Specifications of the National Board of Underwriters."

Mr. Du Bray: It is the intention of the committee to make such acknowledgment.

Mr. Stevens: I move that the specifications be accepted.

Mr. Shaver: In paragraph (d), under Section 1, does the word "Link" refer to a wire fuse or a ribbon fuse?

Mr. Du Bray It can be either one.

Mr. Shaver: In Section 1, under paragraph (e), the reading is, "The fusible wire shall be attached to the terminals in such a way as to secure a thoroughly good connection and to make it difficult for it to be replaced when melted." I imagine possibly the committee refers to the replacement of this by the maintainer, and I do not see why that restriction should be placed on it. Only recently we have discovered that a lot of the average type fuses can be refilled at a whole lot less cost than the original fuse cost, and that they are just as good.

Mr. Du Bray: That clause is taken from the Code, and it reads the same in the Code as it does here.

Mr. Shaver: I want to call attention also to the fact that only recently we have had a lot of trouble in getting fuses, due to the National Electric Code standards being changed, and if the Committee has not recently investigated the requirements of the National Code I suggest that it do so and change their specifications accordingly. It is certain they have not been well settled as to what they require.

Mr. Du Bray: That particular type of fuse known as the screw contact type seems to have no existing standard. The fuse manufacturers will make them in any way to suit the purchaser's requirement. You can get a 75-ampere fuse that is approximately 2 in. long, and you can get a 10-ampere fuse that is 5 in. long, of the same general construction, and it seemed to be the idea that the fuse was made to meet some existing condition, and several of the fuse people advised they would make the fuse in any way that it was ordered.

Earl B. Smith (N. Y. C. & H. R.): I think there should be something here with reference to the refilled fuse, as we use it with pretty good success. We do not use the asbestos filling, but the ventilated cartridge and end gap. In fact, we find the fuse does not deteriorate as much when it is refilled, we seem to get a better surface, and it does not seem to absorb the dampness, which ordinarily deteriorates the fuse.

Mr. Du Bray: We did not feel that we were putting anything in the specifications that would prevent their being refilled.

Mr. Denney: I ask if the condition of the fuse after blowing will be apparent? I have in mind the fuse of an interlocking machine that blows through the operation of the lever, and if the leverman does not find out promptly that the fuse is blown, he will probably report a failure and unnecessarily delay trains.

H. S. Balliet (N. Y. C. & H. R.): While these detectors are

used on inclosed fuses, they are far from reliable in the signal business. I have gone through that, and there is no doubt about it, in my mind, that we ought to have an addition to what is shown in these specifications, a type of fuse suggested by Mr. Denney, so that we will know more definitely that it has blown. That is something that we should know quickly, very quickly, in congested territories.

Mr. Stevens: I move that the section of the specifications just presented by the committee be accepted, with the understanding that the committee will take into consideration the various suggestions which have been made in this discussion.

(The motion was carried.)

The report of sub-committee was then presented by I. S. Raymer, chairman.

Mr. Shaver: I raise this question with regard to pipe coating. Is it supposed the threads will be galvanized or not, or treated in any way or not? This is not brought out here, and, in some cases I know of, they are treated, and in other cases they are not treated. If the thread is not treated to prevent rust, that is the weakest part of the conduit, and it seems to me that it should receive some consideration.

Mr. Denney: I agree with Mr. Shaver, and believe that eliminates hot galvanizing. The inside coating should certainly be hot galvanized.

Mr. Patenall: Does the acid bath remove entirely all the blisters and scales on the interior of the pipe, and such being the case, would it not be rendered smooth, contrary to what Mr. Denney says?

Mr. Raymer: I believe it is the practice with the manufacturers who put on the coating to use enamel inside, whether it has been hot galvanized, sherardized or electro-galvanized. They usually put the enamel on to give a smooth inner surface for the pulling through of the wire.

Mr. Denney: The acid bath is given before the hot galvanizing, and you cannot hot galvanize and have a smooth surface. I would move that the clause 4 be revised, eliminating the words, "hot galvanized, electro-galvanized, sherardized," so as to make it read: "The interior surface of the pipe shall be enameled."

Mr. Balliett: I second that motion.

Mr. Stevens: I do not think that should carry. I am not prepared to discuss the effect of hot galvanizing on the interior of conduits, but I am confident we are using a lot of that material. I believe sherardizing is a better process, but I think you will find that the most serviceable conduit on the market, as Mr. Raymer says, is either galvanized or sherardized first, and then enameled, so whatever we do, we must remember that the enameling will not effectively protect against rust. The conduit will scale, will have pits on the surface, and the only way we can protect against that rust is either by galvanizing or sherardizing.

Mr. Denney: I disagree with Mr. Stevens. Enameling would be one of the best means of protecting the outside of the pipe, if you could put it on and keep it on while the pipe was being handled. You can properly enamel the inside and nothing happens to remove it. A great deal of conduit that is used in buildings is enameled inside, and so far as I know, it is all enameled inside. It is not enameled on the outside because it will not stand the shipping and assembling, and hot galvanizing on the inside would make an unsatisfactory surface for pulling wires through.

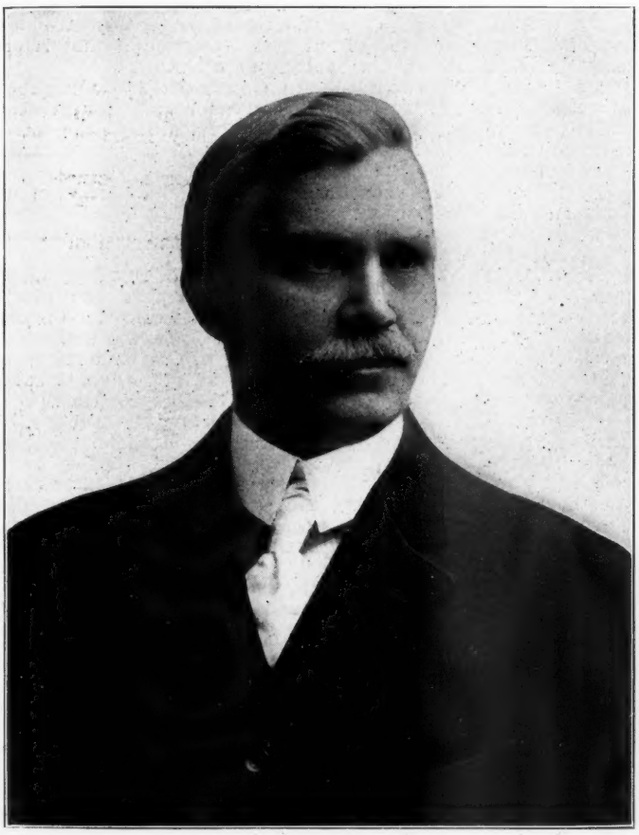
Mr. Raymer: I believe it is possible to hot galvanize and enamel on the interior, also to sherardize and enamel, but do not believe it is quite practical to electro-galvanize and enamel on the interior. We were agreed to let it stand as it is, but added enamel on the interior, after either of the other finishes have been put on.

C. A. Christofferson (N. P.): I suggest an addition to paragraph 3 stating that all cutting and threading must be done before the conduit is galvanized or sherardized, whichever process may be used, in order to have the thread properly covered.

Mr. Raymer: The sherardizing people, I believe, after applying their process, put the product through a paraffine bath, and then enameled the interior if desired.

F. P. Patenall: It seems to me that some tests should be applied before we finally decide this question. It is further evident that pipe properly sherardized will leave a very smooth surface; but I am doubtful, in view of practice with which I am familiar, where steel conduits have been put in without enameling, whether it is desirable to also give them a coat of enamel after sherardizing them. It seems to me that one of these operations is sufficient if we can secure what we are after.

The President: The committee agrees to look into this



T. S. STEVENS, Vice-President.

C. C. ROSENBERG, Secretary.

matter, bearing in mind the discussion which has taken place at this meeting.

J. Beaumont: I move that the specifications be accepted. This will carry certain details to be presented at the next conventions.

C. E. Denney: I offer an amendment, that we accept the specifications as presented at this meeting and that we instruct the committee to revise the specifications and submit a further report to the June meeting. The specifications should be made more definite.

Mr. Raymer: These specifications covering the different kinds of coating embody these various processes, so that the man who draws up a requisition or a specification can cross out the one he does not want.

Mr. Balliett: I second Mr. Denney's amendment.

Mr. Mock: I have had a good deal of experience during the last two or three years in the purchase of this kind of pipe. Some of it was plain black and some other galvanized. For the committee to say what is best is as difficult as to say whether wrought or steel pipe is best under all circumstances.

The Chairman: Mr. President, the committee is not prepared to recommend any one basis of coating pipe. There are several manufacturers making different kinds and we do not care if they are any one of the manufacturers. We have not had sufficient experience to determine that one process is superior to others.

Mr. Shaver: It is a fact that this specification is made up in such a way that it is necessary to use hot galvanized, sherardized or enameled, whatever we may want. If we are getting bids on something of that kind, it is our lookout to see that we prepare our bids on sherardized, electro-galvanized and the like. I believe the committee will be glad to take this into consideration and see if any of these things can be eliminated, but in order to meet the wishes of most of the members as they have expressed themselves in the past, it seems to me they have prepared the specification all right. I think it is very difficult to tell whether one type is better than any other at this time. I do not believe the committee or any member can do it.

The President: The question is on the amended motion, unless it is withdrawn, based on the discussion, which takes into consideration the fact that the committee is willing to consider this question, but the committee do not feel in the state of the art that we can tie the specification down any tighter than it is.

C. E. Denney: I will withdraw the motion with the understanding that the committee will consider this at the annual meeting.

The motion was carried.

Specifications for wrought-iron pipe conduit material was next presented.

T. S. Stevens: In view of the discussion on the specification for steel pipe conduit, which will equally apply to this, I move their acceptance, with the idea that the committee will give consideration to the past discussion that has been had on the specifications for steel pipe conduit.

The motion was seconded.

Mr. Raymer: The specifications for wrought-iron pipe conduit are practically the same, except for the material used in the pipe and the comment that steel pipe conduit will apply to wrought iron pipe.

Mr. Denney: Have there been any tests by the committee showing whether steel or wrought iron is preferable for any particular uses?

Mr. Raymer: We use practically the same test as used in specifications for signal pipe, which are now acceptable to the Association and printed in the Manual.

Mr. Shaver: As a matter of information, I would like to know from the committee whether they have found it possible to get wrought-iron pipe conduit? Is it being furnished commercially at this time?

Mr. Raymer: Yes, sir, I believe you can obtain it.

The motion was carried.

MANUAL BLOCK.

Sub-committee "B" was assigned the preparation of, and submitted, rules for the maintenance and operation of interlocking plants and block signals. Standard code rules of the American Railway Association were accepted as the basis, but for economical reasons were not printed in the report excepting only such of them as are recommended for revision. Such additional rules as are suggested for adoption were also included. Six of the present rules for signalmen were subjected to revision, the principal point covered being the elimination of hand signaling and the substitution therefor of caution cards. Complete rules for maintenance to govern supervisors, signal foremen, and maintainers are given; 13 for the supervisors, 11 for the foremen, and 50 for the maintainers.

The committee consists of T. S. Stevens (A. T. & S. F.), chairman; L. R. Mann (M. P.), E. T. Ambach (B. & O. S. W.), Hadley Baldwin (C. C. C. & St. L.), J. Beaumont (C. G. W.), M. W. Bennett (G. C. S.), E. A. Black (L. S. & M. S.), C. Drake (C. & N. W.), J. A. Fleissner (C. M. & St. P.), M. J. Fox (C. B. & Q.), G. A. Guyer (N. Y. C. & H. R.), B. A. Hinman (N. Y. C. & H. R.), H. K. Lowry (C. R. I. & P.), G. S. Pflasterer (N. C. & St. L.), W. N. Spangler (P. R. R.).

Discussion on Manual Block.

Mr. Rudd: I would suggest that rule 620 be changed. It says "If a signal fails to work properly its operation must be discontinued and until repaired the signal secured so as to display the normal indication." That is probably all right for an interlocking signal. A considerable mileage in this country is automatic, and, at normal, clear. I would like to suggest if there is not some way of getting these amended rules to the committee on operation of the American Railway Association, before our annual meeting.

Mr. Rose: This rule 620, I understand, is for manual block and the rule is for the signal man. Ought not that reference to train movements be cut out of here?

Mr. Beaumont: I would like to answer that by saying that the rules as submitted, both the amendment to the present rules of the A. R. A. and the proposed rules only have reference to interlocking. These rules have no reference to manual block or automatic signals.

Mr. Rose: That is not the point. I don't care whether it is manual block signal or interlocking signal, but I think the rule governing what the train men should do ought not to be mixed in with rules for signal men.

Mr. Stevens: The Rule 629 referred to, in rule 620, specifies some definite action on the part of signal men which they have to know about, and that later the rules for the engine men and train men are handled to bring about this desired result. Practically the thing we are introducing here is the issuance of a caution card instead of the usual hand signals which have been in use up to the present time.

Mr. Rose: I do not believe it is necessary to issue a caution card to get a train by an interlocking signal in the stop position, especially if that signal is 1,000 ft. from the tower and the towerman or signalman is the block operator also. We have a means of doing that by hand signals, and the towerman is required to use a certain colored flag or lantern for his hand signal. The responsibility for passing the signal in the stop position on hand signals is up to the towerman and also to the man that accepts that signal. He is responsible if he gets off of the track and it would tie the railroad up if for every train the towerman had to go to the home signal and hand up a caution card. I do not believe it would be a bit safer.

(Sections 620, 629 and 630 was then read.)

Mr. Beaumont: Under "Proper Operating Conditions," the train movement through the interlocking plant is accomplished by the signalman setting up the route and indicating to the engineman, by means of a fixed signal, that the train may proceed. The act of forwarding the train through the interlocking, under proper operating conditions, is accomplished by the co-operation of the signalman and the engineman, subject to the check of the interlocking apparatus. The removal of the protection provided by the latter, whether by derangement of the machine or other cause, creates a condition necessitating extreme caution to insure the safety of the train movement. The proposed rule, under the principles of which a number of prominent lines are now operating, will, we believe, if adopted, have the effect of still further safeguarding traffic under such unusual conditions as follows:

First, it will cause the train to approach the interlocking signal under conplete control; second, it will cause the signalman to pass over the track to a point beyond the home signal; third, as the signalman is compelled to fill out an order for the engineman to proceed, he will exercise more care in examining the route before giving such authority; fourth, it will give the engineman information as to the nature of the trouble and thus enable him to act intelligently; fifth, it will create a record of an unusual condition for the benefit of the division superintendent, and thus enable him to check such defects more closely; sixth, it will insure co-operation between the signalman and the engineman; seventh, it will prevent a repetition of accidents that have occurred in the past due to misunderstanding of hand signals or verbal orders; eighth, it will restrain

enginemen from passing signals set at stop without written authority.

There are many other points in favor of this method of operation too numerous to mention, which, with the reason above given, seem to point to the advisability of adopting a uniform practice. It is evident that where two or more railroad companies are operating trains through a common interlocking plant, that standard practice could govern, and that such standard practice should be based upon the safest and most reliable methods. Your committee has given this matter such earnest consideration as to lead to the recommendation of the rule proposed as fully covering the conditions, at the same time establishing uniform practice, and therefore recommend its adoption.

Mr. Rose: I do not believe it will work very well on the railroad. That might do all right for an interlocking plant where the towerman had one or two trains a day and he had nothing else to do but pull the levers, but upon the road I am connected with the towerman is also the block operator, especially in the manual block territory. He has to report the passage of trains by his station; he has to obtain permission from the signalman in advance before he admits a train; he has to report the train entering the block; he has to give the clear block to the man in the rear, and we have some home signals that are 800 or 900 ft. from the interlocking cabin, and I don't believe it is necessary to go to all that machinery to get a train by an interlocking signal. Most of the causes for failure to get the interlocking signal clear are on account of some small adjustments. Sometimes the towerman cannot get it clear because he does not have the route lined up properly. In all cases the train stops at the home signal before it proceeds on the hand signal, and while we have had trains derailed there have been no serious accidents, because the trains move through the interlocking limit slowly; they do not run by home signals at 60 or 70 m. p. h. I believe a practical way to do this, just as safely as proposed, is by a scheme of hand signals with lights or flags that are different from the usual flag or lamp carried by the trainmen. At some joint interlocking plants we have two schemes, so that an engineman on one road will not be mixed where a signal is given for a train on the other road. I won't say that we have not had any trouble with it, but it amounts to one or two pairs of wheels on the ground. With Mr. Beaumont's scheme the responsibility is put on the towerman. With our scheme it is put on the engineman, if he accepts such a signal ,and gets into trouble without knowing that the route is all right. While that sounds very nicely, I think it would tie us up too much. It is too severe.

Mr. Stevens: All of Mr. Rose's remarks were presented before the committee for argument. The responsibility is not placed with the towerman. In the first place the rule which is now in effect with reference to trainmen is still retained in effect, and in the second place the man receiving a caution card, if he understands what the caution card means, is not relieved of anything anywhere. The argument that won the chairman over was this: It is the only way that you can tie the engineman and the towerman together; it is the only practical way that you can make sure that the engineman knows that whatever indication is given is intended for him personally and not for some other chap on the railroad. Now the argument was also presented to the committee that there would be lots of places with home signals at long distances, where the practice would be unduly restricted. I believe you will all acknowledge that these places are few and far between. The places where this rule would not be unduly restrictive are far greater in number than those where it would be unduly restrictive, and in handling subjects of this kind, previous to this discussion, many earnest thinkers have thought that it was better to have a rule even if it has to be abrogated to certain specific cases than to adopt a rule for all these specific cases which will apply to them all. Have a good rule if you can, which will take care of 75 to 80 per cent. of your cases, because then some officer of the railroad will have to be asked for permission to abrogate that rule at the places where it cannot be used. That is the position the committee takes with reference to this rule.

Mr. Rose: I do not believe in putting in a rule that will not be lived up to ninety-nine times out of one hundred. There is one thing we have to look out for and that is getting trains over the road. A good many hard-headed officers will not be willing to work under this rule. I do not believe we should put such a rule in the book. Make it a rule for the train to stop at the home signal, then you have your safety. No train is going to get up speed, run off a derail and kill a lot of people. The roads that are operating under this rule, I think, are not working a manual block system.

W. H. Elliott (N. Y. C. & H. R.): While I believe the rule is a good one, it has been our experience that it is impracticable to have it carried out, and in framing our new set of signal rules, practically the same wording that is used here was used. The use of hand signals as authority to pass fixed signals at stop is prohibited. In the discussion that took place among operating officials, assistant general managers and superintendents, it was finally agreed that it was necessary to use hand signals at certain times, as it was not practicable to get a caution card to the engineman, and for that reason we have in our set of rules a hand signal rule. We call for the issuance of the caution card under normal conditions of failure, but in certain exceptional conditions we allow the signalman to give a hand signal. This rule, if adopted, works out, according to my experience in this way, that where the signal is a great distance from the tower and on a modern plant with 18 or 20 crossovers, signals must of necessity be 900 ft. or more, in certain cases, from the tower. The signalman, instead of writing his card and taking it out to the engineman, calls for a trainman to come in, or waits for the trainman to come in, writes out the card and sends it to the engineman. What is the result? The man is trusting to luck. He may have his lock levers reversed and the route practically set out, but he does not know it. The engineman, on a dark night, cannot tell which way the switches are set, and he is going ahead without any assurance that the route is properly set and located. For that reason, while I believe such a rule is desirable, if you can enforce it, I do not believe it is practicable and that it is wise to have a hand flagging rule, carefully worded, to prescribe its use, and have that in the set of rules.

Mr. Denney: The committee has gone from one extreme to another, from all hand signals to all caution cards. There is a middle ground, and I believe they can fix the rule by inserting another paragraph, something along those lines—"for blank movements," or "at blank locations, hand signals may be used," with the idea that it will be filled in by the road. It is not a difficult or impossible thing to handle regular train movements, through movements, by caution cards, and they are the more important movements, because you are handling more equipment and the best grade of equipment; but it is possible, under certain conditions, to authorize hand signals for switching movements, and I am satisfied that the proper enforcement of a caution card rule, which I am in favor of, requires a modification, not by the time card. You have no rule, if you modify it on all divisions by the time card as you see fit, but make the rule, or a part of the rule provisional so that the road may use it as they see fit. There is no weaker rule than the rule that is modified by the time card. And the committee, if it believes, that the rule will at some places have to be modified by time cards, should revise the rule.

Mr. Rose: I have heard it said that you cannot railroad by the book of rules, but the time is coming when we are going to railroad by the book of rules, and it is very close.

Mr. Mock: I am in sympathy with the rule giving the railroads some leeway, and I think that is the chairman's thought in the presentation of his argument in favor of the rule. He says the railway officials should be permitted to abrogate the rule in special cases.

A. R. Fugina (L. & N.): I do not believe it is necessary to tie up the operation of an interlocking plant in order to issue caution cards. I have handled this proposition with our operating people recently, and made a canvass of the entire situation and I find the operative people as a rule are against it on our railway. Investigations brought out that they had no cases on their railroad within a reasonable number of years on which they had had accidents due to trains coming together on account of hand signals. I believe it is by far the most general practice to operate by hand signals through the interlocking plants, and I believe where we do have accidents, it is usually due to some other weak condition on the railroad; that if the operating rules are properly observed and the men are taught to observe the rules, there will be no trouble.

Mr. Denney: I want to modify my suggestion to the extent of making the supplement to this rule refer to locations. Make it refer only to specified movements, so that the rule will be uniform over the entire line. What I say is not with the intent of discrediting caution cards for through movements or for any movements that can be governed by them, and that can be determined by the road putting the rule in effect. It is the business of this association, and its members to reduce the number of caution cards that are to be issued, and they will be reduced as maintenance is improved. While you have an important train that is making a through movement and it should go by high speed, or medium speed sig-

nals of an interlocking plant, they should not be authorized to make a movement at a speed at which they would, if the route was not right, be led into a serious derailment; they should be given the caution card, and it should be done after the man knows the route that he is given is right. The additional time for giving the card is fully warranted in a given case.

E. B. Smith (N. Y. C.): We have been using this card a good many years under very busy traffic conditions. While our new card is not used in the form of a caution card, it is a proceed card and can be used for closing in of trains, that is with the direction of traffic. We found it a very good rule and we would have had lots of trouble if we did not have it. In fact, if you take this rule you will not have the engineer and the operator jointly responsible for the same thing. You make your operator responsible. He feels that he has that responsibility and he will look at the route. If your operating department is working with you you will have no trouble at all, because if there is anything that happens it is up to the operator and nobody else, and it is a clear cut case against him. We operate this rule and also use a card for each home signal. If he had three on this route to pass he would have to have three cards to get past them. While it does not delay us much, it is good for the maintenance end. When a man gets a card the operator has to report it and the engineer has to turn it in. Therefore we get hold of it, and if we have a failure, we can trace it. On a four track busy railroad, as in our case, with a switch out of commission, that is the time we need the card because we have the operator check the maintainer on the line, to see that the route is operated properly and to see that the man has gone where he is supposed to go. The operator in that case is responsible for the whole movement.

Mr. Stevens: We are willing to have this rule put in.

Mr. Rose: This rule might be all right on a 4 track railroad or on some great railroad that has an automatic block system from one end to another, but you are making this rule for everybody. I contend that 99 per cent. of the railroads of the country are not going to live up to that rule. If the operator hears someone blowing a whistle at the home signal he will not look at any of the switches until he gets through. He will hike right out with his ticket.

W. N. Manuel (G. R. & I.): There is not any question in the minds of any of the members but what there is need for more co-operation between the runner and the signal man, where part of the interlocking plant is out of service. In some cases that I have heard of, a route has been lined up for the crossing road, and trainmen have accepted hand signals. That is certainly dangerous and it could be taken care of by the use of the caution card. Certainly there could not be any harm in saying, "Unless otherwise provided for, hand signals should not be used."

Mr. Denney: I would suggest that the committee, supplement Rule 629 and revise it to provide about as follows: "Hand signals may be used for the following blank train movements, and must be given on the track on which the movement is to be and in such a way that there can be no misunderstanding on the part of the engineman or the trainman as to the signals, or as to the train or engine for which they are given." That would make this a combination of the old rule and the new rule, and allow for flexibility to be determined by the road adopting the rule, in toto or in part.

Chas. A. Cotton (A. T. & S. F.): Is it intended that the head brakeman should do his own flagging? If he comes in on the hand signal without doing his flagging he is called in for investigation.

Mr. Elliott: I would like to suggest to the committee the substitution of the word "set" for the words "line up" in the next to the last paragraph.

Mr. Rudd: The Pennsylvania has some small lines, and some big ones, almost as big as the New York Central. We have 100 per cent. block signalling where passenger trains are run and part of it is automatic, part of it is manual block. We do not permit our men to pass the manual block system at stop position without a card. At many of the interlocking signals we have the block system. As I remember it, we require a man to get the card before he passes an interlocking signal set at stop. It is not always necessary for the signal man to fill out the blank. At some of our plants where the signals are half a mile from the cabin, the signal is located at the telephone station or the bridges and the man fills out the card, on advice of the operator. I cannot state absolutely that we require a card to pass every home signal, but as I remember that is the case. It certainly is the case where the interlocking signal is the block signal. We have found it possible to operate in that way. If you adopt a rule that you should use a caution card at all points, you will not get rid of your trouble. A fellow will not always look at his switches, but will run out with his ticket and let them go. You can bank pretty fully on a man that issues a hand signal from the cabin, that he is not going out on the route. So I do not see that it is a very great argument against the card. You certainly will not be any worse off and you may be better off. I do not think that it is the province of this association to make rules. That is the province of the American Railway Association. They are working on amended rules now. I believe the way for us to handle this under the present extraordinary circumstances, is instead of our trying to formulate a rule, to pass a resolution at this meeting, that it is the sense of our signal association that caution cards should be substituted, or ordered substituted, for hand signals, to enable an engineman to pass an interlocking signal at stop, and that we should send that resolution to the secretary of the American Railway Association.

Mr. Beaumont: The committee has simply carried out the instructions assigned to them, namely, have drawn up for your consideration rules governing operation and maintenance of interlocking plants, and block signals. I fully agree with Mr. Rudd. Insofar as the A. R. A. is concerned, such rules as they make should be based upon the best practice, should be based upon the experience of the fellow who knows what is wanted, and if you decide that this association should not make operating rules, you should also decide that this association should recommend to the men who make the rules, what they believe to be the best practice.

Mr. Rudd: I do feel that the A. R. A. would not take it in bad part if we should give them the benefit of our experience and I do not believe it would handicap them seriously. I think we ought to tell them what we think. If they do not agree with us they can turn it down. If they adopt it, we will be so much ahead of the game.

Mr. Stevens: As the chairman understands it, we will consider that the operating rules are eliminated from the report. We will this afternoon present a resolution to this association simply stating that in the opinion of this stated meeting the process of getting trains by home signals, which are not working by caution cards are preferable to that of getting them by hand signals. That will be the purport of the resolution practically.

Mr. Rudd: And that if you please the purport of rules 663 and 667.

Mr. Stevens: Yes.

Mr. Shaver: If we will instruct our men and choose good men, we can have no fear that good results will be obtained in handling an interlocking plant, in case of a failure or in case where a caution card or hand signalling might be necessary. I do not see that there is any particular objection to the use of a caution card by those who want to use it. At the same time hand signaling might be just as good, and perhaps it is more desirable in some situations. I do not believe that we should restrict our practices to one particular thing. I know of places where such a rule could not be used and get trains over the road.

Mr. Beaumont: To clear the matter, the committee will consider the modification of the rule, so the recognized practice will be both ways. That is the only way that we can meet the feeling of the association. In other words the caution cards shall be recognized in the rules as being a method of handling the trains instead of hand signals. That is hand signals can be included in a modification, or alternative in the rule itself. If that will meet the objections raised and will dispose of the matter, we will be very glad to have it that way.

Mr. Denney: I have one further suggestion. The committee has done the work as shown in the proceedings. This afternoon they can submit some revisions. I think a motion could be put this afternoon, advising the American Railway Association of the work done to-day, and ask them if they wished the work of the committee continued along the same lines or along revised lines, or if they wished the work discontinued.

A. H. Rudd: Mr. Shaver makes the statement that there are places where trains cannot be gotten over the road if the card is used. That is a pretty strong statement.

Mr. Fugina: It seems to me, if there is a demand for a rule of this kind it should come from the interlocking people. They are handling the movements over those plants. Whether we should hamper them by suggesting a rule for handling traffic over the plant is questionable. Now, if a rule can be lived up to, and is lived up to, it will be all right, but there are many rules that are not lived up to. I do not think we should consider this rule at all.

Mr. Stevens: I move that we pass on to the rules for supervisors, with the understanding that this subject will be brought up again for discussion this afternoon.

The motion was carried.

C. J. Kelloway (A. C. L.): Rule 702. I would like to suggest that the first part of the rule read, "They shall be responsible for the safe condition and proper maintenance of signals and interlocking plants. They must make temporary repairs of such defect as may endanger or delay the movements of trains, and promptly report defective conditions to the——." I move that the last part of that paragraph be struck out, as rule 703 takes care of it.

Mr. Beaumont: I want to say that we have copied verbatim under "Supervisors" the standard rules of the A. R. E. A. We consider that these rules have been adopted by a superior association, in a way, and we thought we would better accept these instead of making modifications that better accept these instead of making modifications that might possibly improve them. A number of the members of the committee believe as Mr. Kelloway does, and in order to save time, if you are going to revise the rules, I would suggest referring the entire matter back to the committee.

C. J. Kelloway: I will include this in my motion.

J. C. Mock: I second the motion.

Mr. Stevens: The committee did not discuss the rules of the A. R. E. A., because they thought they were a senior association. The rules ought to be accepted, and afterwards, if it be the sense of this association that some of these rules can be revised, the suggestion ought to be made to the A. R. E. A., and the rules ought not to be revised here.

Mr. Beaumont: In order to bring the matter clearly before the house, I move an amendment to the original motion, namely, the adoption of the A. R. E. A. rules for supervisors of signals, as adopted by the A. R. E. A. supervisors.

The motion was seconded.

J. C. Mock: It is not intended by this motion to criticise the action of the A. R. E. A. Perhaps the same action by this committee to the Engineering Association would be entirely proper. If we see fit to suggest revisions to the Engineering Association, I think that is quite proper. These rules do come very close home, and it is very proper that this association should scan these rules, much more so than the A R. E. A. rules, which we are operating under.

The President: Are you ready for the motion to refer these rules back to the committee for further consideration, in as much as these rules do not now meet the views of the members of this association?

The motion was carried.

Signal foremen rules were next considered.

Mr. Stevens: I don't believe that we can improve on any of these rules very materially.

Mr. Beaumont: The rules for signal foremen as presented are a copy of the A. R. E. A. I believe they fully cover conditions. The committee has been very careful in drawing up rules for maintainers which fully cover the ground. Considering those rules, the rules for signal foremen are certainly right, and I move the adoption of the report covering signal foremen.

The motion was seconded and carried.

Maintainer rules were then considered.

Mr. Fugina: Seven hundred and fifty-nine does not look like a good rule to me—"and that small parts are properly secured from theft." How about the large parts?

Mr. Beaumont: Too heavy to carry away.

Mr. Denney (Reading Section 760): I think that should read: "and should report if insufficient men are on duty."

The President: The committee accept the suggestion.

Mr. Fugina: The operating rules cover a great many of the points in Rule 761. That is the action that the signal man should take when different things occur. I wonder if the committee considered those rules in connection with these. There might be some conflict. I know that our operating rules require that in case of storm the signal man shall see what is the proper way to handle the situation. This practically puts it up to the maintainer, and the same with reference to 761.

Mr. Stevens: We maintain that, regardless of any rule issued to the signal men by the operating department, it is still a track duty of the signal foreman to know that these conditions exist.

Mr. Manuel: If a signal man is located over a vast territory, it will be impossible for him to see that a signal plant is taken care of by track men. I think that ought to be up to the track man. I do not believe the signal forces should have anything to do with it.

Mr. Beaumont: That has reference to 760.

The President: The committee have been willing to consider suggestions that have been made. Perhaps they will consider this in that way.

Mr. Smith: Why not have the maintainer cooperate with the track forces or signal forces? If our men are notified to get on the ground, we also have the maintainer men cooperate with them. I think there should be cooperation between the three men.

Mr. Stevens: The point is, where are you going to obtain your information from on a division? Where is the head of the signal forces to obtain his information from? You can not issue instructions to the section man. He is not reporting to the signal foreman or supervisor or someone else on the division in charge of signal work. What we wanted to do was to provide a way in which the supervisor would be kept in touch with the situation at the time of stalls. There are telephones and telegraph along the line, and several ways to find out what is happening at a point where a man is standing. We cannot specify those things, but we simply say that the plant is being taken care of during stalls.

J. A. Peabody (C. & N. W.): I believe this is a good rule just as it stands. The maintainers themselves must, in a heavy snow storm, take general charge, see that sufficient men are on hand or ask for them and take charge of them, and distribute them so as to get the best results.

Mr. Denney: Referring to 763, would that not be more definite as to the kind of record the committee recommends be kept? It says, "Showing failures or other unusual occurrences." That would become a log book.

Mr. Stevens: That is a very good thing to keep in mind, failure being the principal thing.

Mr. Denney: Isn't it proper to indicate what the record shall cover? I presume it is primarily intended to cover delays to trains and not an indefinite statement, "or other unusual occurrences."

Mr. Stevens: The principal thing is failures. We encourage the keeping of any other history which might be useful. We have failures first. We are specific about that and we put the other in to show the man that it will be appreciated if there is any unusual occurrence, which may be interesting at some future time, if he will make a record of it.

Mr. Denney: I think you could amplify your provision in regard to keeping a record, showing what the committee recommends.

The President: I know personally in a recent case that the facts that a towerman kept a record of a fire started in an adjoining building a few minutes before a certain train passed saved the insurance to the company. The statement was made that the train set it on fire. Shouldn't you leave it to each road to say what it shall keep? The committee will consider that.

Mr. Fugina: In 767 we have that same thing I spoke about before. We say that this must be signed by each signal man on duty. I think we should have a rule to the signal man that would conform to this.

Mr. Beck: In connection with rule 768, I should like to know what the intentions of the committee are in regard to the tests. The application of $\frac{3}{16}$ in. on the point, in the average derail connection, will allow the point to roll.

Mr. Beaumont: The committee gave that considerable thought. It is pretty hard to specify a test that will be satisfactory. We will ask for constructive criticism on that point. The committee have recommended the best rule they thought it possible to suggest.

Mr. Smith: Wouldn't $\frac{3}{16}$ in. on a hundred-pound rail cover it? We have got to lock up so tight on the rolling, it is not good maintenance, and you have several failures you would not have, because you have to pull the point very tight.

Mr. Waldron: I think with a 100-lb. rail it is practically impossible to maintain the $\frac{3}{16}$ in.

Mr. Beaumont: It is the standard test.

Mr. Rudd: It is one of the most serious propositions that we have been discussing for the past two or three years with our power operator plants. We have been making a weekly test in our terminals and we find that with a $\frac{3}{16}$ in. tester, or perhaps a $\frac{1}{4}$ in. tester, that the lock bars the locking of the dogs in the lock rods, and will shear out the bars. We have tried case hardening. We have found that our inspection tests, to avoid trouble, caused more trouble than if they were not made, and we are making them less frequently now. We have not been able to find any way to prevent the rod shearing. We have not solved it yet. A $\frac{3}{16}$ in. on a power operating plant is practically impossible.

Mr. Beaumont: The rules show pretty much in detail how the various points would be maintained, but it was the thought of the committte, while lost motion is objectionable in certain ways, yet in certain pointed locks there was no

objection to a certain amount of lost motion. Yet we found it difficult to specify how much would be allowed for this, that and the other. Consequently we considered those essential points, and made this paragraph in regard to point locks, etc.

Mr. Waldron: If this lost motion was of such a nature that it would cause an accident, would you not have the maintainer rectify it at once, refer to some place in your rules where such would be the case?

Mr. Denney: The reducing of clearances should not be up to the maintainer, and this paragraph should be revised to provide that the standard clearance or the provided clearance should not be reduced.

Mr. Rose: I move that rule 774 be sent to the American Railway Engineering Association, with the request that this association would like to have that rule interpretated under the rules for section foremen, and that this committee revise the reading of the rule, so that the maintainer will report conditions of bad drainage rather than attempt to correct it.

The motion was seconded and carried.

The resolution concerning signalmen was presented at this point, as follows:

Mr. Beaumont: The committee has drawn up a resolution to be submitted, as follows: "Resolved by the stated meeting of the R. S. A., held at Chicago, March 17, that a recommendation be made to the A. R. A. that a rule be provided permitting the use of a caution card to move a train against an interlocking signal displaying stop indication, where such stop indication is brought about by an interruption in the interlocking apparatus." I move its adoption.

The President: Does the committee understand that if this resolution carries, they will eliminate from this matter as it will be presented to the convention rules 620, 629, 630, 631, 663 and 667?

Mr. Beaumont: Yes. The A. R. A. rule now provides that a hand signal shall be given, as shown in 620 and 629. All we desire in connection with that rule and with the point aimed at through this resolution is recognition of the caution card for that kind of a movement. It will not discredit the present practice of using hand signals as presented to the A. R. A.

Mr. Stevens: We are in favor of the resolution, unanimously, as to the members of the committee here present. We prefer the resolution should be submitted and adopted and that the rules as presented should be adopted.

The resolution was adopted and the report of the committee was accepted, and the committee retired.

STANDARD DESIGNS.

The committee submitted drawing 1058, for a cast-iron anchor post for use in concrete foundations; drawing 1099,

J. C. MOCK,
Chairman Committee on Standard Design.

showing the proper location of detector bars and clip bolts, the former with reference to the height of the bar above and below the rail, and the latter with reference to the distance from the bottom of the rail at which the drilling is to be done; drawing 1225, stuffing box for one-inch pipe, with full details; drawing 1226, stuffing box for wire, with details; drawing 1250, connections for a double-slip switch and movable-point frog; and drawing 1251, showing lock rod and operating connections, and giving details of the insulation of front and lock rods complete for single switches with plunger locks, for movable-point frogs with switch and lock movements, and for double-slip switches with switch and lock movements; and details of operating rods for single switches, single slip switches, and movable-point frogs.

The committee consists of J. C. Mock (M. C.), chairman; C. C. Anthony (P. R. R.), G. E. Ellis (K. C. T.), W. A. Hanert (N. Y. C. & H. R.), C. J. Kelloway (A. C. L.), F. P. Patenall (B. & O.), M. E. Smith (D. L. & W.), R. E. Trout (Frisco).

Discussion on Standard Design.

Mr. Mock: The committee has discussed and recommended certain variations from the dimensions on certain drawings. The first one is on the tang piece. We found the manufacturers were up against a rigid inspection that required 31/32 in. as the diameter of the tang ends. The inspectors did not allow any variation from that and the difficulty of manufacture required a certain leeway. Our recommendation is that the minimum diameter be 15/16 in. and maximum 63/64 in., and the nominal diameter on the drawing is 31/32 in. We ask if that is favorable. The idea is that the manufacturers will feel that they are within the specifications when they manufacture according to that variation.

The recommendation was adopted.

Mr. Mock: In cold rolled steel pins the allowable variation which we recommend for 1¼ in. crank pins is .002 in. undersize. For ⅞ in. turnjaw pins, turn to gage, not larger than ⅞ in., less one-thousandth inch, and when smaller than ⅞ in. not less than three-thousandths of an inch, and that is a variation of .002 in.

The recommendation was adopted.

Mr. Mock: In our meeting with the manufacturers of wrought iron pipe I may say that we found a necessity for a change in the specifications in regard to the tensile strength and the elastic limit. We desire to move that the specifications for the tensile strength shall be 48,000 lbs. per sq. in. for the maximum and 40,000 lbs. per sq. in. for the minimum, and that the elastic limit be 30,000 lbs. per sq. in. for the maximum and 22,000 lbs. per sq. in. for the minimum. The elongation is to be 12 per cent in the measured length of 8 in. That is for wrought iron pipe.

The recommendation was adopted.

T. S. Stevens: May we know just what results you expect to bring about by this reduction in tensile strength?

J. C. Mock: Briefly, the process of manufacturing wrought iron is through puddling furnaces; you get muck iron from the puddle and then it is reheated and given a silicon bath, and then taken out and rolled, so that the silicon is mixed in with the iron, and that forms a sort of scale on the iron. It is contended by the manufacturers, and I imagine with scientific correctness, that the scale preserves the iron against rusting. As we know, wrought iron pipe costs more than steel pipe, but it is in the long life of the wrought iron pipe that its advantage lies. The process of manufacture, however, in the case of wrought iron is that they cannot get the high tensile strength or high elastic limit that they can in the steel pipe, which is homogeneous.

I. S. Raymer (P. & L. E.): I investigated the properties of wrought iron for pipe, when I was looking up the question of conduits, and the information I got shows that the manufacturers of genuine wrought iron wish to have the maximum for tensile strength at 48,000 lbs. and the minimum at 40,000 lbs., as recommended by the committee.

Mr. Mock: The committee would like to have the association members to think about the subject of galvanizing hook bolts and see if they have now any trouble from rusting and the weakening of the parts where the hook bolt comes in contact with the pipes. The other question, which seems to be with us always, is the question of arm spacing. The committee have looked over the vote on this subject, and their analysis does not, in our opinion, justify us in assuming that we have a two-thirds majority vote in favor of 6 and 7 ft. spacing. I think the 6-ft. spacing will not be satisfactory between the top and second arms, because you will have no air gap between the second arm at clear and the top arm at stop. It is desirable to keep the bottom arm 22 ft., in our opinion, although we are not an absolute unit on that point. You can have the third arm about 9 ft. 6 in. below the second arm, and not change the kind of pole; that is, you do not have to go to three sections of pole. It will not increase the number of standards; but that is the limit. So that unless we change the poles, the ladders and all the work we have done up to this date, you should keep in mind that if we have 7 ft., which almost everybody believes is the right distance

between the top and second arms, we should not have anything above 9 ft. 6 in. between the second and third arms. If you do that, you are getting to 6 in. section of pipe.

Mr. Shaver: Mr. Mock spoke of making the lower arm 9 ft. 6 in. below the second arm. Does that mean increasing the pole two feet more?

Mr. Mock: Yes.

Mr. Denney: I move it is the sense of this meeting that the standards should be completed on the 7-ft. and 6-ft. basis.

The motion was carried.

T. S. Stevens: I move the adoption of 1058 for presentation to the annual meeting.

The motion was carried.

Mr. Mock: Ten hundred and ninety-nine is really a specification for the angle of the bar and the spacing and location of poles in the rail where the clip must be fastened. It does carry with it an indication of the design that was adopted as standard last year for a bar, but the chief purpose is to standardize the angle and the location of bolts. Those are 5-in. centers and through the center.

Mr. Mock: Twelve hundred and twenty-five, the drawing of a stuffing box. We had some trouble in getting the equipment of the stuffing box down to a place where we could locate 2¾-in. centers. This does it. The committee expect to follow this up with a series of water type apparatus, where you have street car work and other work of that character.

C. J. Kelloway: I have used it for about twelve years. It answers the purpose. I move that drawing 1225 be adopted as the sense of this meeting for presentation to the convention.

The motion was carried.

Mr. Mock: The next is stuffing box for wire. Wee presented this drawing last year, but we provided for two wires in a pipe. After a pretty thorough canvass of the situation, it was decided by the committee to eliminate the one showing two wires in the pipe, and it is aimed to have only one wire in the pipe. It is merely a question of elimination in this case. I move ts adoption for presentation to the convention.

Mr. Beaumont: I think we should standardize this drawing because many lines prefer to use ½-inch pipe, and with this statement that this standard stuffing box could be used on ⅜-in. pipe with the use of a bushing. I think that would be better than adopting a ⅜-in. stuffing box, where there might be objections by lines that wanted to use ½-in. pipe.

The motion was carried.

J. C. Mock: The next drawing represents a double slip switch. This drawing, with the details of the lock rod, is in use, and is very satisfactory to the road using it. You will appreciate, of course, that the space between the ties is very limited, if you have to insulate between the rails, and that there are a great many limitations to the forms which you can use; you are pretty well tied down to certain forms of rods and forgings for this sort of a switch. The committee presents it for the purpose of getting the discussion and opinions of the Association for guidance.

Mr. Elliott: As near as I can see, the switch lock rods and front rods are patterned after the Pennsylvania standard. I believe they are getting good results, and that if a little time was given, or additional drawings were furnished, which would show the details of the parts, something along this line might be adopted with good results. By having the two front rods attached to points on the same side of the track, additional clearance is provided between the two inner rails, which is not had if the front rod is connected to both points of the one switch. It seems as if with this design insulation might be well provided. The only suggestion I have to make is that the throw of the switch points be made five in., the throw of the frogs four in., and that ties plates be shown on all ties.

The President: Can Mr. Elliott's point be met by any of these detailed parts? Can the throw of the switch be made 5 in. with those details?

Mr. Kelloway: There is no objection to that; in fact, I see no reason why you should move the frog points four in. and switch points five in. If the frog is safe at four in., certainly the switch is at five in.

L. S. Ross: I think you would get all you can. If you can't get five in. take four, but where you can get five in. you should take it.

J. C. Mock: This adjustment is a turnbuckle, with both right-hand threads, so that you cannot change the spread of the switch points unless you take off one of the feet. It is simply to bring it into adjustment in assembling and is not a standard turnbuckle.

L. S. Rose: I do not see any use in having anything there. The facing point lock rod, or the lock rod the plunger goes through, is adjustable, and you can work it from there. With that sort of adjustment I do not believe it is necessary to have this adjustment in the front rod. No adjustment has been provided in the end rod. All you can do is to make a kink in the switch point between the throw rod and the front rod.

W. H. Elliott: That point seemed to me a good one. It is not our practice with the ordinary single switch, and is not necessary; but in a double slip where you are crowded for room, and it is exceedingly difficult to make adjustments, it will undoubtedly help.

A. C. Rudd: We used to use 3½ in. on frogs and 4½ to 5 on switches, but we have now a standard, over the lines east and west of 4 in. on everything. With this adjustment in the operating rod, you can get a bigger throw, if you want to, because you can draw your points together. Instead of a 4-in. throw, you can get 4½ or 5, and can use the standard on the road by pulling the points closer together; I advocated not over a 4-in. throw, because it makes it easier for the leverman, if you have a 5-in. throw, you have just that much more to travel, and that much less leverage. If you make it 4-in., you gain on the leverage, and from the signalman's standpoint, you get a better operating switch with 4 in. than with 5. Four in. is plenty, and there is no need of having it five.

J. C. Mock: Why have you both right-hand threads instead of right and left?

A. C. Rudd: So that if you have to disconnect in order to adjust, the track man won't come in and open and close it; and so that the signalman is responsible for the throw.

Mr. Peabody: I believe that, both from a track and signal standpoint, the longer the throw of the switches, the better. There is a point that I think has been overlooked, and that is, the smaller the throw of the switch, the smaller the distance at the end of the switch between that and the main rail. The longer the switch point is, the smaller that distance will be, and the more shock from every wheel that passes through your switch, and the more wear on your road.

J. C. Mock: That is true. I believe you have endeavored to get a 5-in. throw on switch points. The detail at this time as far as we wish to present it to you, is given on drawing 1251. These are drop forgings at the end and it does give a rather low lock rod. It is necessary to have the drainage, and get pretty well down on the tie with this lock rod. It might be regarded as an objection to have the rod turned edgewise, as compared with the flat rod, but the flat rod is really not practicable, in our opinion.

L. S. Rose: I am not ready to agree to that adjustment. You can vary the throw of the switch by your adjustment, by the amount of lost motion you have in that basket, without changing the distance between the two points at all. If the switch is properly constructed so that it will fit, I do not see any use of having that adjustment, and it is an element of weakness. The turnbuckles get rusty and sometimes break. After they have been used a while you have to heat them and burn the rust off to get any adjustment. They are convenient when you are first setting the switch up, but after you get it up, I do not see that it makes any difference; if the relation between the front rod and the throwing rod is properly made when the switch is installed, there is no need of that adjustment. One other thing I would like to present to the committee—we have recently built some slip switches where we staggered the points. Instead of throwing the points at both ends of the slip together, we are throwing one switch at one end, with one switch at the other end. In that way we are able to effect locking between the switches and the center frogs, and prevent a train from getting in on the center frogs unless they are absolutely set; that is, the frog will have to be set properly before the switch can be thrown to make the through movement.

Mr. Kelloway: How would you adjust a No. 1 rod? Say you have a front rod that is set up for a 5-in. throw; you find a switch that has only 4½-in. throw; how would you adjust your front rod to fit the switch, if your No. 1 rod isn't adjustable?

Mr. L. S. Rose: We have an adjustment at the lug. You can take a switch of two points and move 5 in. or 4 in.; it depends how far apart your gage is at the point of the switch and in the stock rail and in the running rail.

Mr. Waldron: Mr. Rose and Mr. Peabody advocate a 5-in. throw, although it has been shown that the adjustment is so arranged that they can have a 5-in. throw if they want it. Some of us may not use switches where we would use a 4-in. throw; we must get along with less. I think it would be better to have some standard that will suit all parties. Take the layout as presented here; you can accommodate

Mr. Rose and Mr. Peabody, and also those of us who have to use less than the 4-in. throw. Shouldn't we adopt the 4-in. throw as we have it presented here?

Mr. Denney: I would like to ask Mr. Rudd, if the adjustment is not applied to the front rod because it connects two of the switch points that are not a pair; the head rod connects the pair of switch points that are used in running the train over, while the front rod connects one point of each pair, and the distance between these points cannot be distinctly determined until the switch is set up.

Mr. Denney: I would like to ask Mr. Rudd if this layout develops any lost motion, and if so, where.

Mr. Rudd: No more than any other arrangement of interlocking. The place where the insulation is made in this rod is a matter of considerable thought. I didn't like it myself, but finally had to come to it because we found it was so good.

Mr. Waldron: We have found in slip switches, etc., that it prolongs the life of the point, and also the stock rail, by having the switch point on the curved side extended a foot to a foot and a half beyond the other point, and then have a check rail beside it. That induces a new feature of locking up the point, and while we have tried to get around it, and think we have, I wondered if the committee cared to go into that detail.

Mr. Stevens: There is more involved in the slip switch than in the single switch, and it is proper that the committee should decide this first.

Mr. Rudd: The Pennsylvania had much trouble with slip switches. We waited several years for the R. S. A. to put out a standard, and we couldn't wait any longer, and we developed this, and it is entirely satisfactory to us. It would be very nice to have another one gotten up with staggered points. Some roads won't use them in their main tracks. We use them in the yard, and it makes a saving to have one point ahead of the other, but it is not thought advisable in some cases to stagger the points on the main line. I think the association should go slowly, and if they can get the A. R. A. to adopt staggered points all the way through, and submit this in the meanwhile, we will use this until you give us something better. I think you should make a drawing of the single switch.

Mr. Denney: I move it is the sense of this meeting that in the switch ends of a double slip, each two points acting as a pair should be connected by two nonadjustable rods.

Mr. Elliott: Do you refer to the front rods?

Mr. Denney: I refer to the front and head rod on each pair; in other words, a slip will be made up of two switches, each pair of points in a switch being directly connected and not adjustable.

W. H. Elliott: I am against it. I think one of the good points about this design is that the front rods are connected to the points of the different switches, not to the same switch, because it provides additional clearance where it is very much needed, between the two inside points.

Mr. Denney's motion was lost and the original motion was carried.

ELECTRIC RAILWAY AND ALTERNATING CURRENT SIGNALING.

This committee submitted specifications and requisites of apparatus and material for alternating current automatic block signal systems on all railways except those using direct or alternating current for propulsion—in other words, on steam roads—and certain additions to existing specifications. In the data for a signal system the blanks under the sections as previously approved by letter ballot have been filled in with certain alternative specifications as required by existing practice, the quantities given in each case being representatve of satisfactory systems, and being submitted as a guide for the design of systems applicable to the conditions to be met. The specifications cover the subjects of supply and distribution of power; signals of the electric motor; solenoid, electro-pneumatic and light types; control apparatus, including line circuit and track circuit relays and circuit controllers; electric locks, and switch indicators.

The committee consists of H. S. Balliet (N. Y. C. & H. R.), chairman; J. E. Saunders (A. T. & S. F.), W. P. Allen (P. R. R.), J. A. Beoddy (N. & W.), L. R. Byram (C. R. I & P.), J. D. Elder (K. C. T.), E. C. Grant (U. P.), W. W. Morrison (N. Y. C. & H. R.), C. R. Peddle (I. R T.), W. Y. Scott (B. & M.), E. B. Smith (N. Y. C. & H. R.), F. S. Starratt (S. P.), F. E. Wass (N. Y. C. & H. R.).

Discussion on Alternating Current.

Mr. Balliet: I move that the specifications beginning on page 29 be accepted as printed. (The motion was seconded.)

Mr. Stevens: As to 76-d, I do not see why any special load is specified.

Mr. Balliet: The literature for the annual meeting will read as follows: The normal load on the signal transmission line at a point adjacent to the place of delivery shall be approximately . . . K. V. A. . . . . K. W. This load will increase to . . . K. V. A. . . . . K. W. to last one minute after interruption.

Mr. Stevens: I move an amendment to clause 440-h and all similar clauses as follows: For continuous operation at ten per cent under normal frequency without excessive heating.

Mr. Balliet: That is agreeable to the committee.

Mr. Stevens: For the sake of record, I wish to say there are one or two other clauses in which the same correction should be made.

The Chairman of Committee VIII stated to us yesterday that a new method is to be employed for stating requirements of certain instruments and those are to be tabulated instead of written out. I think clause 601 is rather hard to understand because it really means that line circuit relays shall consume not more than 10 volt amperes 7½ watts per phase at 110 volts 25 cycles, or 25 amperes 15 watts per phase 110 volts 60 cycles. It is hard to get that from that sentence, but I believe the chairman will take care of it.

H. S. BALLIET,
Chairman Committee on Electric Railway and Alternating Current Signaling.

Mr. Balliet: The committee developed at a more recent meeting that even the experts outside of the committee, our conferees, had difficulty in getting the points, in carrying it through, when they read this literature, so that the committee proposes to submit at the annual meeting in tabulated form sections 440, 601 and 602, which reduces the printing to about one half a page, and makes it possible at a glance to get the thing in mind.

The previous motion was carried.

WIRES AND CABLES.

The committee submitted a set of revised specifications for galvanized steel wire for connection to mechanically operated signals, which is recommended for approval. The specifications cover the material, with reference to the form and quality of the wire, the galvanizing treatment and the properties, as to size, diameter, breaking strength, and percentage of elongation in a given length.

The committee consists of W. H. Elliott (N. Y. C. & H. R.), chairman; E. L. Adams (L. S. & M. S.), W. I. Bell (P. R. R.), W. L. Dryden (S. I. R. T.), A. B. Himes (B. & O.), D. W. Richards (N. & W.), J. V. Young (B. & M.).

Discussions on Wires and Cables.

Mr. Elliott: I move that the recommended revised specifications for galvanized steel wire on page 39 be adopted. There are modifications in the first three paragraphs; clauses 4 to 7 inclusive remain unchanged. The revised specification reduces the weight from 380 lbs. to 370 lbs. for the No. 8 wire, and from 320 lbs. to 300 lbs. for the No. 9 wire. It also

increases the elongation in 10 in. from 6 to 8 for the No. 8, and from 5 to 8 for the No. 9. A three mill variation from the normal diameter is also allowed as to size.

Mr. Elliott: The wording of the specification has been changed to practically conform with that adopted in other specifications, and the requirements as to variation in size,

W. H. ELLIOTT,
Chairman Committee on Wires and Cables.

difference in weight and difference in tensile strength and elongation have been adopted. The twist test has not been changed.

The motion was carried.

STORAGE BATTERY AND CHARGING EQUIPMENT.

The committee submitted as information a discussion in regard to the use of Edison storage batteries for automatic signaling. This comprised a short description of this type of storage battery with principal reference to its application to track and line circuits and methods of housing, with a table of general information. The committee also submitted specifications for lead type stationary storage batteries for automatic signaling, and a plan (drawing 1240) of a

R. B. ELLSWORTH,
Chairman Committee on Storage Batteries.

motor panel which provides for mounting charging line rheostats and motor starting apparatus.

The committee consists of R. B. Ellsworth (N. Y. C. & H. R.), chairman; H. W. Lewis (L. V.), J. G. Bartell (L. V.), G. E. Beck (L. S. & M. S.), T. N. Charles (C. N. O & T. P.), J. Fred Jacobs (C. R. R. of N. J.), T. L Johnson (D. L. & W.), A. H. McKeen (O. W. R. R. & N. C.), T. J. O'Meara (N. Y. C. & H. R.), F. A. Purdy (O. S. L.), A. H. Yocum (P. & R.).

Discussion on Storage Battery.

Mr. Ellsworth: The discussion of the design of storage battery on pages 47, 8 and 9, is printed as information. This was in answer to inquiries, and covers what may be done and is actually being done. No action is required unless there is some objection to the subject matter. The committee is making no recommendation at this time.

The specifications on page 50, items a and f with the following explanatory notes, is in a tentative form. The committee has not fully decided as to just what they want to recommend to the association and they are furnishing this information so the association may be aware of what the committee is doing, and so that we may bring out criticisms either written or verbal at this time.

Mr. Stevens: At the annual convention I asked that the Plante process be defined, and I think that is still desirable.

Mr. Ellsworth: The committee has investigated that subject considerably. In going over the matter the definition given by the Signal Dictionary seems to be supported by all the information which we could get from the various text books. That information is given on page 326.

On 51 we prepared a motor panel plan, twelve-forty, which is supplemental to the panel that has already been adopted, shown on 1,174. This panel is for the control of the motor generator which is used for the charging of the storage batteries. I will move the adoption by this meeting of panel R. S. A., plan 1,240.

Motion seconded.

Mr. Shaver: As I understand it, this is a main service switch. In a great many places they only allow us to put it at the board; it has to be put at the wire entrance. I am doubtful whether it would be well to show this, because the requirements in nearly all the cities are that it be placed right at the entrance of the wires to the building.

Mr. Ellsworth: In most cases the insurance is carried by the railroads, and the underwriters' rules are not obligatory. In many cases also the apparatus is placed on a separate building.

The motion was carried.

METHOD OF RECORDING SIGNAL PERFORMANCE.

The committee was instructed to investigate and report on the basis of methods now used on various railways in recording interruptions to traffic by signals, and in computing the efficiency of signal performance. A letter was sent to 50 railways reported by the Interstate Commerce Commission as having automatic block signals in service, in which the following information was requested:

(1) Copies of forms now in use, together with instructions issued as to the proper method of filling them out;

(2) Formula used in computing signal performance;

(3) Suggestions as to desirable alterations in or additions to the method used;

(4) Opinion as to whether or not comparative cost per mile or per signal blade should enter into the computations of comparative efficiency as between divisions, systems or railways; and

(5) Any general comments on methods now used, forms that have been presented to the association, or information that would guide the committee in best serving the association and the railways.

From the replies and report forms received sufficient information was obtained to warrant the preparation of the three signal report forms, "A," "B" and "C," which were submitted.

Form "A" is a blank, postcard size, addressed to the supervisor of signals, and intended to be filled out by the conductor or engineman and given to the operator or signalman at the first open telegraph office for telegraphic transmission to the dispatcher and subsequent mailing to the supervisor. Or it may be telephoned direct to the dispatcher by using a portable phone. It contains the information shown on all other forms except as to indicators; track being repaired; handcar in block; line wires down; lightning storm; or a signal clear which failed to go to the stop position.

Form "B" is used by the dispatcher in recording information transmitted from forms "A" and "C," and by operators and signalmen in receiving and transmitting similar information to the maintainer. The dispatcher, after receiving the mantainer's report, sends copies to the superintendent and signal supervisor.

Form "C" is intended to be filled out and given to the operator or signalmen for transmission to the dispatcher.

Copies are mailed to the supervisor, and on some roads to the signal engineer. The maintainer also keeps a copy for his records.

The committee submitted also a brief report of the various factors involved in computing the efficiency of signal performances. Complete forms showing classifications of failures and methods for computing efficiency will be presented at the June meeting. The data received in reply to the circular letters involves such a large amount of detail which is so much in need of classification and uniformity that more time is necessary for their consideration than could be spared at this meeting. The committee proposes as a basis upon which to design forms for the classification of causes and

W. N. MANUEL,
Chairman Committee in Method of Recording Signal Performance.

for computing the efficiency of signal performances the following:

F, failures: 10.
S, total number of signals: 100.
T, trains stopped: 50.
O, total number of trains operated: 1,500.
P, total number of signal operations: 150,000.

Formulae.

Signal operations, 150,000.
Trains stopped per failure, 5.
Signals per failure, 10.
Trains operated per failure, 150.
Signals operated per failure, 15,000
Trains operated per train stop, 30.
Signal operations per train stop, 3,000.
Maintenance efficiency, 90 per cent.
Operating efficiency, 96 per cent.

The committee consists of W. N. Manuel (G. R. & I.), chairman; J. W. Hackett (N. Y. C. & H. R.), C. A. Cotton (A T. & S. F.), B. F. Dickinson (W. J. & S. S.), S. B. Keller (B. & O.), George J. Patton (D. L. & W.), J. B. Weigel (Frisco), L. L. Whitcomb (L. S. & M. S.).

Discussion on Methods of Recording Performance.

Mr. Manuel: This shows the results we wanted to obtain first, but on account of lack of uniformity between the various reports presented, it was impossible within the short time we had to work it up. We started in with telegraphic reports, started in to show typical forms in use to-day.

Mr. Denney: I move the adoption of Form A. (Seconded.)

Mr. Waldron: On page 41, Form A, No. 5, lightning storms. That is a peculiar way of putting it and is new to me.

Mr. Manuel: On some roads they have found it desirable for enginemen to report weather conditions at the time of the failure, and that was included in the blank.

Mr. Shaver: With regard to Form A it has been our practice to use a card for the conductor to indicate stops at signals. We have asked them not to report delays due to trains in the block. I am about ready to change my mind on that. We have had considerable difficulty on account of maintainers who have been called out on supposed trouble that did not occur, and I suggest to the committee that that be shown on the record. The conductor fills out this card when the train is stopped, and he does not always learn until his train has passed through the block or is nearly through that there was a train in the block, and nine times out of ten they either have to change the card or tear it up. It does not show what the cause of the failure is.

W. J. Eck (Southern): I am unable to check the formula for Maintenance Efficiency. It is stated $\frac{E-F}{S}$. I think it should be $\frac{S-F}{S}$.

Mr. Manuel: That is right.

Mr. Eck: With regard to Form A, I would suggest that the paragraph appearing at the bottom of the back of the card be moved up and inserted between the lines S and U, to be followed with a heading, entitled, "Operator's Record." The note, appearing on the front of the form under the words, "Deliver immediately," should be printed on the back of the form following the line beginning "Sent by," etc. I believe the form as shown would confuse the engineman and he would attempt to fill out the part reserved for the operator.

Mr. Manuel: Under D it reads, "Signal at ——." There is a doubt in the minds of some members whether that means the geographical location of the signal or the position of the signal blade.

Mr. Rose: The same cards have been in use for a year on one road that I know of, and have generally given satisfaction. I would leave "D" out. That is intended, as I understand it, for signaling at interlocking plants, and the operator can report that matter himself without the conductor or engineer putting it in.

Mr. Denney: Not only signals at interlocking plants, but at any outlying point as a train order or any signal which has no number are covered by this line. I do not think the objection is proper.

Mr. Rose: Mr. Denney brought up a point I had not thought of, that the line might refer to a switch signal. Some roads have stop signals at outlying switches, and there would be no one there to report, and in that case it might be well to leave it in.

The President: On page 521 of the March journal is shown a form of engine man's signal report which was adopted by letter ballot as standard.

Mr. Stevens: This standard has been in force for only a few weeks and yet there is a movement on foot to change it. If we contemplate adopting any new forms with the possibility of their being carried at the annual convention, I think we ought to keep out of the manual the forms submitted in 1912, and I think a motion to that effect is in order.

Mr. Denney: I move that the forms corresponding with the forms now submitted and approved by last year's letter ballot shall not be included in the manual.

The Secretary: Can we legitimately do that?

Mr. Stevens: Not at this meeting.

Mr. Elliott: The matter is adopted as the standard of the association, but that does not mean that the executive committee or editing committee can not hold it out.

Mr. Patenall: It seems to me doubtful whether a stated meeting can reverse the action of the annual meeting.

Mr. Denney: In view of the fact that the committee which has been assigned to this subject has made a report which supersedes the form previously reported, I do not see why we should not approve it and take any necessary action to keep the previous cards out of the manual.

The President: The committee does not ask to have this approved. They would like to have it received as information.

Mr. Mock: If it is permissible, I suggest to the Board of Directors that they withhold from the manual those forms which were balloted upon and which carried. That is as far as we need to go, I think.

Mr. Denney: I move the approval by this committee of Form A.

Motion seconded and carried.

Mr. Rose: I move that the meeting approve Form B as presented by the committee.

Motion seconded and carried.

Mr. Elliott: I move the approval by this meeting of Form C.

Motion seconded and carried.

Mr. Manuel: The committee would like a discussion on the table intended to show a method for computing efficiency of signal performance.

Mr. Rose: The last paragraph says: "One road arbitrarily assumes five train stops per failure," but these reports that we have concluded to send to letter ballot show the number of trains delayed in the maintenance report, so that instead of assuming five, you will have the actual number if you take these blanks.

Mr. Manuel: The card says, "Do not report delay due to train in block."

Mr. Rose: On the maintenance report of failure, it says, "Trains delayed," and he will report to his superior officer the number of trains delayed and you will have the actual performance and not the assumed performance. Sometimes you have only one train delay, and sometimes a good deal more, depending upon how swift he is to get around to it.

L. R. Mann (Mo. Pac.): In the maintenance efficiency, has the committee considered the matter of taking the total number of signals, the number of switches, and the number of track circuits and figuring maintenance efficiency on that basis?

Mr. Manuel: The committee went into signal indication only.

Mr. Elliott: We have gotten up on the New York Central a new blank which endeavors to cover that point. There are two records kept, one is of signal efficiency and the other is of the operated units of the interlocking plant, not included in the signal efficiency report, and while appearing on the same sheet is entirely different subject matter.

Mr. Manuel: It would be desirable to take into account track circuits, the length of track section and all of that data, if it would not complicate the forms too much. Some men like to have the reports very simple, and others like to have them complicated, and there is no semblance of uniformity between the roads.

Mr. Shaver: I have been trying to think out what this formula for maintenance efficiency means. I do not see why the number of failures should be subtracted from the number of signals. Take the case of ten signals and ten failures, the percentage would figure out nothing, yet there would be a certain efficiency.

Mr. Elliott: Our practice is, to divide the number of signal operations by the number of failures, and such a record has been kept by us for the last ten years and has been very satisfactory. It has furnished, I believe, a very accurate method of comparing the operations of different sections of signals, or the signals on different divisions.

Mr. Shaver: We have certain divisions where the signaling is very much the same, and the track circuits, the number of signals, and the general design are suitable for a comparison. We have divided the number of interruptions, as we call them, into three classes, A, B and C. A are those for which the maintainers are strictly responsible. B represents those for which the track department, or some department other than the maintenance force on signals are responsible, and C interruptions are due to constructive defects in design, etc., over which the maintainer has no control. We have figured out from our records, percentages which we call, excellent fair, good and poor, and we class our performances each month on that basis, and that gives us a basis for comparison between divisions and between months on the same territory. While that will answer for ourselves, it does not necessarily answer for other railroads.

Mr. Denney: The report does not take into consideration the number of miles protected by a given number of signals, and I want to offer the thought that the efficiency of signal operation might be determined by multiplying the number of signal operations by the number of miles of track protected, divided by the number of failures, and the efficiency of train operation might be determined by multiplying the number of trains operated by the number of miles of track protected and divided by the number of train stops. This is an attempt to include the number of tracks, stations, switches, and all the other conditions which enter into the calculation. The liability of a failure increases as long sections are installed, and the number of trains stopped by signal failures varies in different territories depending upon the density of movement.

Mr. Manuel: The next subject treated by the committee is entitled "Signal Movement Defined." I might add, for information, that where counters are used, you take a chance of the signal jumping and operating the counter. The maintainer, in adjusting the signal with the counter may work it a number of times. The signals operate a good many times when they are not registering, for the reason that the yard man may throw his switch, or a number of things might happen that will not be counted when the signal is really giving protection.

Mr. Denney: I think the only satisfactory way of taking the record, is from the counter. The counter may get out of order, and not register enough, or there may be some improper operation of the counter, which will run the counter high, but if you take the record of the counter readings for a division or number of sections in the same territory, you can easily pick out the records which are not correct.

Mr. Elliott: Our practice is based on counting the number of signal movements.

Mr. Mock: I have not used the counter because I think you get the record too high, and the efficiency too high.

Mr. Manuel: The next section relates to Failures.

Mr. Elliott: I move that this committee make recommendations for decisions as to what signal failures shall be.

Motion seconded and carried.

Mr. Manuel: The next section is headed "Relative Cost." There was no discussion.

Mr. Manuel: The final section of the report is headed "Conclusion."

Mr. Patenall: I move that the committee be instructed to continue their work in this direction.

Motion seconded and carried.

A. E. R. A. BLOCK SIGNAL COMMITTEE MEETING.

The Joint Committee on Block Signals of the American Electric Railway Engineering and Transportation and Traffic Associations will hold its second meeting of the year to-day. The morning session will be given over to an inspection of the exhibits at the Coliseum, and the afternoon session in part to conferring with representatives of the various signal companies, and in part to an executive meeting of the committee. The members are J. M. Waldron, signal engineer, Interborough Rapid Transit Company; John Leisenring, signal engineer, Illinois Traction System; Gaylord Thompson, chief engineer Ohio Electric, and C. H. Morrison, signal engineer, New York, New Haven & Hartford, of the Engineering Association; and C. D. Emmons, general manager, Chicago, South Bend & Northern Indiana Traction Company; J. J. Doyle, general manager, Washington, Baltimore & Annapolis; B. E. Merwin, general superintendent, Aurora, Elgin & Chicago; and C. F. Conn, of the Transportation and Traffic Association. The meeting will be held in the Congress Hotel.

SIGNALING CONTRACTS IN INDIANA.

The Terre Haute, Indianapolis & Eastern, the Fort Wayne & Northern Indiana and the Union Traction Company of Indiana awarded contracts last week to the General Railway Signal Company for the signaling which the Railroad Commission of that state has ordered installed by July 1, of this year. Automatic block signals of the light type, arranged for both permissive and positive block operation as conditions require on the various stretches of track to be protected, will be employed. The installation will provide for the protection of about 30 miles of track on each of the three roads.

SIGNALS ON A "SAFETY FIRST" EMBLEM.

The Southern Railway recently adopted a "safety first" emblem which uses a modern upper quadrant automatic block signal as a feature of the design. This is one of the first emblems of this kind which recognizes the very important part played by the signals in securing safety on railways. One of the principal objects of the safety first campaigns has been to reduce the number of industrial accidents among employes, but as the movement extends to the broader question of safeguarding transportation in all the many phases in which the human element is employed, the importance of block signaling, and particularly of automatic block signaling, is rapidly coming to the front. The signals deserve more recognition such as the Southern Railway is giving them.

REGISTRATION—RAILWAY SIGNAL ASSOCIATION.

ACTIVE MEMBERS.

Allan, E. A., Supr. Sigs., Northern Pacific Ry., Livingston, Mont.
Allen, W. P., Inspr. of Sigs., P. R. R., Philadelphia, Pa.
Anderson, B. T., Asst. Sig. Engr., A., T. & S. F. Ry., Topeka, Kan.
Balliet, H. S., Past President, Engr. M. of W., Grand Central Terminal and Sig. Engr. of the Elec. Div. & Elec. Zone, N. Y. C. & H. R. R. R., New York.
Beaumont, J., Sig. Engr., C. G. W. Ry., Chicago, Ill.
Beck, Geo. E., Supr. Sigs., L. S. & M. S. Ry, Toledo, Ohio.
Beoddy, J. A., Gen. Sig. Inspr., N. & W. Ry., Roanoke, Va.
Black, E. A., Supr. Sigs., L. S. & M. S. Ry., Ashtabula, Ohio.
Breecher, A., Sig. Inspr., C., M. & St. P. Ry., Fond du Lac, Wis.
Brown, Alex., Sig. Engr., C., M. & St. P. Ry., Milwaukee, Wis.
Brown, Larsen, Gen. Sig. For., A., T. & S. F. Ry., Topeka, Kan.
Butridge, J. H., Gen. Constr For., I. C. R. R., Chicago, Ill.
Byram, L. R., Supr. Sigs., C., R. I. & P. Ry., Chicago, Ill.
Christofferson, C. A., Sig. Engr., Northern Pacific Ry., St. Paul, Minn.
Combs, Harry, Sig. Inspr., L. S. & M. S. Ry., Cleveland, Ohio.
Cormick, James H., Sig. Inspr., Northern Pacific Ry., St. Paul, Minn.
Cotton, Chas. A., Div. Sig. For., A., T. & S. F. Ry., Chillicothe, Ill.
Cowherd, G. R., Supr. Sigs., A., T. & S. F. Ry., La Junta, Col.
Davis, R. L., Office Engr., M. C. R. R., Detroit, Mich.
Dawley, W. M., Engr., Erie R. R., New York, N. Y.
Dawson, Wm., Asst. Supr. Sigs., L. S. & M. S. Ry., Chicago, Ill.
Denney, C. E., Past President, Sig. Engr., L. S. & M. S. Ry., Cleveland, Ohio.
Dodd, E. B., Supr. Sigs., M., St. P. & S. S. M. Ry., South Minneapolis, Minn.
Drake, Caleb, Gen. Sig. Inspr., C. & N. W. Ry., Chicago, Ill.
Du Bray, A. B., Inspr. Elec. Sigs., St. L. & S. F. R. R., Springfield, Mo.
Dunham, Chas. A., Director, Sig. Engr., Grand Trunk Ry., Montreal, Que., Canada.
Eck, W. J., Elec. Engr., Southern Ry., Washington, D. C.
Elliott, W. H., Sig. Engr., N. Y. C. & H. R. R. R., Albany, N. Y.
Ellis, E. F., Supr. Sigs., C., C., C. & St. L. Ry., Mt. Carmel, Ill.
Ellis, G. E., Sig. Engr., Kansas City Term. Ry. Co., Kansas City, Mo.
Elsworth, R. B., Asst. Sig. Engr., N. Y. C. & H. R. R. Co., Albany, N. Y.
Fitz Gerald, J. M., Engr. Maint. of Sigs., N. Y. C. & H. R. R. R., Albany, N. Y.
Fleissner, John A., Sig. Inspr., C., M. & St. P. Ry., Milwaukee, Wis.
Foale, H. J., Sig. Engr., Wabash Ry., Decatur, Ill.
Folley, E., Sig. Supr., C. & E. I. R. R., Terre Haute, Ind.
Ford, F. A., Supr. Sigs., C. & O. Ry., Hinton, W. Va.
Fox, M. J., Asst. Sig. Engr., C., B. & Q. R. R., Lincoln, Neb.
Frantzen, Oswald, Supr. Sigs., N. Y., N. H. & H. R. R., Boston, Mass.
Fugina, A. R., Sig. Engr., L. & N. R. R., Louisville, Ky.
Grant, E. C., Supr. Sigs., U. P. R. R., Omaha, Neb.
Gray, G. B., Sig. Inspr., Penna Lines West, Pittsburgh, Pa.
Hackett, J. W., Sig. Supr., N. Y. C. & H. R. R.R., Buffalo, N. Y.
Harland, W. H., Elec. and Sig. Engr., N. Y., O. & W. Ry., Middletown, N. Y.
Harman, H. H., Engr., Bridges, B. & L. E. R. R., Greenville, Pa.
Hartley, L. C., Chief Engr., C. & E. I. R. R., Chicago, Ill.
Hodgdon, C. R., Sig. Engr., Canadian Pac. Ry., Winnipeg, Man., Canada.
Hulsizer, G. W., Sig. Engr., C. & A. Ry., Bloomington, Ill.
Kelloway, C. J., Sig. Engr., Atlantic Coast Line, Wilmington, N. C.
Killian, H. L., Asst. Supr. Sigs., L. S. & M. S. Ry., Toledo, Ohio.
Kirkpatrick, T. E., Supr. Sigs., L. S. & M. S. Ry., Elkhart, Ind.
Kolb, E. W., Sig. Engr., B., R. & P. Ry., Rochester, N. Y.
Lee, Frank, Prin. Asst. Engr., Canadian Pac. Ry., Winnipeg, Manitoba, Can.
Leet, C. S., Asst. Engr., B. & L. E. R. R., Greenville, Pa.
Leisenring, John, Sig. Engr., Illinois Traction Co., Springfield, Ill.
Lomas, H. F., Asst. Sig. Engr., I. C. R. R., Chicago, Ill.
Long, E. F., Asst. Sig. Supr., C., R. I. & P. Ry., Washington, Iowa.
Lorenzen, H. C., Office Engr., N. Y. C. & H. R. R. R., Albany, N. Y.
Lowry, H. K., Supt. Sig. Constr., C., R. I. & P. Ry., Chicago, Ill.
Lundy, B. A., Asst. Engr., N. Y. C. & H. R. R. R., Albany, N. Y.
Lutz, T. E., Supr. Sigs., C., C., C. & St. L. Ry., Galion, Ohio.
Mack, E. E., Supr. Sigs., C. & E. I. R. R. Salem, Ill.
Mann, B. H., President, Sig. Engr., Mo. Pac. R. R., St. Louis, Mo.
Mann, L. R., Supr. Sigs., Mo. Pac. R. R., St. Louis Mo.
Manuel, W. N., Sig. Supr., G. R. & I. R. R., Grand Rapids, Mich.
Mill, J. C., Asst. Sig. Engr., C., M. & St. P. Ry., Milwaukee, Wis.
Miskelly, Samuel, Gen. Sig. Inspr., C., R. I. & P. Ry., Chicago, Ill.
Mock, J. C., Sig. Engr., M. C. R. R., Detroit, Mich.
Montzheimer, Arthur, Chief Engr., E., J. & E. Ry. Co., Joliet, Ill.
Morkill, R. F., Sig. Engr., Grand Trunk Ry., Montreal, Can.
Morris, D. R., Sig. Engr., E. P. & S. W. Ry., El Paso, Texas.
Morrison, W. W., Asst. Sig. Engr., E. D., N. Y. C. & H. R. R. R., New York, N. Y.
Mullen, Joseph, Engr. M. of W. C., C., C. & St. L. Ry., Mattoon, Ill.
Mullins, W. J., Sig. Inspr., C. G. W. Ry., Chicago, Ill.
Mutchler,, C. B., Sig. Engr. Grand Trunk Pac. Ry., Winnipeg, Man.
Newcomb, E. W., Sig. Engr., Oregon Short Line, Ogden, Utah.
Oppelt, J. H., Supr. Interlocking, N. Y. C. & St. L. R. R., Bellevue, Ohio.
Orr, H. H., Sig. Inspr., C. & E. I. R. R., Chicago, Ill.
Patenall, F. P., Vice-President, Sig. Engr., B. & O., R. R., Baltimore, Md.
Peabody, J. A., Sig. Engr., C. & N. W. Ry., Chicago, Ill.
Pflasterer, G. S., Director, Sig. Eng., N. C. & St. L. Ry., Nashville, Tenn.
Pflasterer, H. B., Gen. Sig. For., N. C. & St. L. Ry., Nashville, Tenn.
Phinney, R. M., Asst. Engr., Sig. Dept., C. & N. W. Ry., Rogers Park, Chicago, Ill.
Porter, L. B., Sig. Inspr., C., M. & St. P. Ry., Milwaukee, Wis.
Ragland, R. R., Sig. Supr., Mo. Pac. Ry., De Soto, Mo.
Raymer, I. S., Asst. Sig. Engr., P. & L. E. R. R., Pittsburgh, Pa.
Rice, D. S., Sig. Supr., L. V. R. R., Geneva, N. Y.
Rose, L. S., Sig. Engr., C., C., C. & St. L. Ry. Cincinnati, Ohio.
Rosenberg, C. C., Secretary-Treasurer, Consulting Signal Engineer, Bethlehem, Pa.
Ross, Robert, Gen. Sig. For., Pere Marquette Ry., Grand Rapids, Mich.
Rudd, A. H., Sig. Engr., P. R. R., Philadelphia, Pa.
Schultz, E. E., Asst. Sup. Sig., C. & N. W. Ry., Chicago, Ill.
Seifert, T. C., Sig. Inspr., C., B. & Q. R. R., Chicago, Ill.
Shaver, A. G., Sig. Engr., C., R. I. & P. Ry., Chicago, Ill.
Smith, Earl B., Supr. Sigs., Elec. Div., N. Y. C. & H. R. R. R., New York, N. Y.
Spencer, Chas. H., Engr., Washington Terminal Co., Washington, D. C.
Stephens, Chas., Sig. Engr., C. & O. Ry., Richmond, Va.
Stevens, Thos. S., Vice-President, Sig. Engr., A., T. & S. F. System, Topeka, Kan.
Stewart, A. W., Supr. Sigs., Atlantic Coast Line, Charleston, S. C.
Stradling, E. G., Sig. Engr., C. I. & L. Ry., Lafayette, Ind.
Vandersluis, W. M., Sig. Engr., I. C. R. R., Chicago, Ill.
Waldron, J. M., Sig. Engr., I. R. T. Co., New York.
Weigel, J. B., Dist. Sig, Supr., St. L. & S. F. Ry., Springfield, Mo.
Wheelwright, Barton, Block Sig. Insp., Grand Trunk Ry. System, Valparaiso, Ind.
Whitcomb, Fred E., Sig. Engr., B. & A. R. R., Boston, Mass.
Williams, John F., Sig. Supr., C., C., C. & St. L. Ry., Springfield, O.
Willis, W. H., Sig. Engr., Erie R. R., Jersey City, N. J.
Worthing, E. E., Supr. Sigs., T. & N. O. Ry., Houston, Texas.
Zane, Wm. F., Chief Draftsman, Sig. Dept., C., B. & Q. R. R., Chicago, Ill.

JUNIOR MEMBERS.

Falk, C. L., Sig. Maint., Wabash R. R., St. Louis, Mo.
Hanert, Wm. A., Draftsman, N. Y. C. & H. R. R. R., Detroit, Mich.
Hartvig, C. E., Sig. For., C., R. I. & P. Ry., Englewood, Ill.
Hyatt, Thos. G., Sig. For., Wabash R. R., St. Louis, Mo.
Kellenberger, K. E., Sig. Inspr., C. & N. W. Ry., Evanston, Ill.
Stueber, A. A., Sig. For., C., B. & Q. R. R., Lincoln, Neb.
Tillett, C. H., Sig. Inspr., C. & E. I. R. R., Chicago, Ill.

ASSOCIATE MEMBERS.

Ackerman, F. J., care of Union Switch & Signal Co., Swissvale, Pa.
Ames, Azel, Kerite Ins. Wire & Cable Co., New York, N. Y.
Backus, E. E., Sales Engr., Gen. Ry. Equipment Co., Chicago, Ill.
Baker, Ray N., Rep., Central Electric Co., Chicago, Ill.
Beck, H. M., Engr., Electric Storage Battery Co., Chicago, Ill.
Brach, Leon St. Clair, Pres., L. S. Branch Supply Co., New York, N. Y.
Brixey, Richard, Pres., Kerite Ins. Wire & Cable Co., New York, N. Y.
Brown, J. Alexander, Mgr., Pocket List R. R. Officials, New York, N. Y.
Bryant, Stanley C., Sig. Engr., Bryant Zinc Co., Chicago, Ill.
Burt, C. H., Signal Accessories Co., New York, N. Y.
Cade, J. T., Vice-Pres., Federal Signal Co., New York, N. Y.
Cameron, F. C., Corning Glass Works, Corning, N. Y.
Camp, W. M., Editor, "Railway Review," Chicago, Ill.
Cloud, K. G., Western Rep., "The Signal Engineer," Chicago, Ill.
Collins, M. W., Mgr., Maloney Oil Mfg. Co., Scranton, Pa.
Cook, W. J., Pres., Cook Railway Signal Co., Denver, Col.
Cook, W. L., United States Electric Co., Chicago, Ill.
Corey, F. B., Union Switch & Signal Co., Swissvale, Pa.
Cozzens, Chas., care of U. S. & S. Co., Chicago, Ill.
Cozzens, J. J., U. S. & S. Co., New York, N. Y.
Daves, G. W., Edison Storage Battery Co., Orange, N. J.
Dean, A., Jr., Res. Mgr., Union Switch & Signal Co., Chicago, Ill.
Distch, A. F.
Dodgson, F. L., Cons. Engr., General Railway Signal Co., Rochester, N. Y.
Doran, H. G., Western Mgr., Com. Acetylene Ry. Light & Sig. Co., Chicago, Ill.
Drury, H. A. K., Dom. Ry. Co., Ottawa, Can.
Eckert, A. P., Sales Mgr., Wire Dept., National India Rubber Co., New York, N. Y.
Edmunds, Frank W., Sales Agt., Dressel Ry. Lamp Works, New York, N. Y.
Foster, Frank M., Mfr., Switch Stands, Columbus, Ohio.
Foster, W. E., Ingalls-Shephard Forging Co., Chicago, Ill.
Ferguson, H. K., Asst. Gen. Mgr., Samuel Austin & Son Co., Cleveland, Ohio.
Gage, R. G., Railway Sig. Co., Ltd., Lachine, Que., Canada.
Gammons, R. F., 2nd, Treas., U. S. Elec. Signal Co., West Newton, Mass.
Garrity, P. A., Rep., Thos. A. Edison, Inc., Chicago, Ill.
Geer, M. F., Sales Engr., General Railway Signal Co., Rochester, N. Y.
Gifford, H. E., Jr., care of L. S. Brach Supply Co., New York City, N. Y.
Gillingham, W. J., Jr., Western Agt., Hall Signal Co., Chicago, Ill.
Graber, Geo. A., Kerite Ins. Wire & Cable Co., Chicago, Ill.
Griffith, H. Maynard, Student, Massachusetts Institute of Technology, Boston, Mass.
Griffin, H. W., Engr., Union Switch & Signal Co., New York, N. Y.
Guillaume, F. L., Pres., W. F. Bassert Mfg. Co., Utica, N. Y.
Hawley, W. P., Mgr., U. S. Light & Heating Co., New York, N. Y.
Hayes, S. W., Pres., Hayes Track Appliance Co., Richmond, Ind.
Henry, W. S., Prin. Asst. Engr., General Railway Signal Co., Rochester, N. Y.
Henze, C. D. A., Res. Mgr., Federal Signal Co., Chicago, Ill.
Hobson, J. S., Western Sales Mgr., Union Switch & Signal Co., Chicago, Ill.
Hollister, H. L., Sig. Eng., Hall Switch & Signal Co., Garwood, N. J.
Holloway, H. C., The Rail Joint Co., Chicago, Ill.
Hovey, M. H., Cons. Sig. Engr., Madison, Wis.
Hovey, W. G., Railway Sales Dept., The Okonite Co., New York, N. Y.
Howe, W. K., Chief Engr., General Railway Signal Co., Rochester, N. Y.
Howard, L. Frederic, Chief Engr., Union Switch & Signal Co., Swissvale, Pa.
Hudson, E. E., Mgr. Sales, Primary Battery Dept., Thomas A. Edison, Inc., Orange, N. J.
Jacobs, Harry M., Sig. Accessory Dept., General Electric Co., Schenectady, N. Y.
Johnson, Sidney, Gen. Sales Mgr., Union Switch & Signal Co., New York, N. Y.
Jones, Chester H., General Electric Co., Chicago, Ill.
Jones, F. H., Res. Mgr., General Railway Signal Co., San Francisco, Cal.
Kellogg, W. O., care of General Electric Co., Philadelphia, Pa.
Kinch, W. M., Sig. Engr., Gordon Primary Battery Co., New York, N. Y.
Klink, A. F., Pres., Bryant Zinc Co., Chicago, Ill.
Kyle, W. T., Duplex Metals Co., New York, N. Y.
Lane, W. H., Chief Engr., Hall Signal Co., New York, N. Y.
Lavarack, F. C., Gen. Sales Mgr., The Signal Accessories Co., New York, N. Y.
Lavarack, W. W.
Lepreau, F. J., Thos. A. Edison, Inc., Chicago, Ill.
Lorenz, J. M., Salesman, Central Electric Co., Chicago, Ill.
MacDonough, G. H., Gen. Mgr., Potter Winslow Co., Chicago, Ill.
McCready, Harold, Asst. to Elec. Engr., U. S. & S. Co., Wilkinsburg, Pa.
Martin, L. G., Engr., The Okonite Co., New York, N. Y.
Massey, Chas. F., Pres., C. F. Massey Co., Chicago, Ill.
Miller, P. W., Rep., Kerite Ins. Wire & Cable Co., New York, N. Y.
Moore, Albert, Adv. Mgr., General Railway Sig. Co., Rochester, N. Y.
Moore, Philip W., Gen. Mgr., The P. & M. Co., Chicago, Ill.
Mulleneaux, H. J., Works Mgr., Hall Sig. Co., Garwood, N. J.
Nachod, C. P., Gen. Mgr., Nachod Signal Co., Philadelphia, Pa.
Nelson, G. A., Gen. Mgr., Gordon Primary Battery Co., New York, N. Y.
Nolloth, Chas. S., F. D. Lawrence Electric Co., Cincinnati, Ohio.
Patenall, T. H., Sig. Engr., U. S. & S. Co., New York, N. Y.
Paterson, Robt. A., Eastern Mgr., C. F. Massey Co., New York, N. Y.
Peddle, W. A., Sales Dept., Hall Signal Co., New York, N. Y.
Pflasterer, C. S., Ry. Signal & Tel. Depts., National Carbon Co., Cleveland, Ohio.
Poor, C. O., Asst. Res. Mgr., General Railway Signal Co., Chicago, Ill.
Poor, F. A., The Rail Joint Co., Chicago, Ill.
Prout, Hedley, Mgr., J. L. Morrison Co., Chicago, Ill.
Quin, J.
Reiff, G. N., Rep., Union Switch & Signal Co., Winnipeg, Man., Canada.
Renton, Jos. A., Kerite Ins. Wire & Cable Co., New York, N. Y.
Rhea, Frank, Commercial Engr., General Electric Co., Schenectady, N. Y.
Roberts, John, Sig. Accessories Dept., General Electric Co., Schenectady, N. Y.
Schoenmehl, C. B., Waterbury Battery Co., Waterbury, Conn.
Smarth, V. I., Prof., McGill University, Montreal, Que., Canada.
Sperry, H. M., Sales Mgr., General Railway Signal Co., Rochester, N. Y.
Simmen, P. J., Northey-Simmen Signal Co., Indianapolis, Ind.
Stiles, T. Geo., Manufacturer, Arlington, N. J.
Swanson, C. E., Asst. Sales Agt., Hazard Mfg. Co., Pittsburgh, Pa.
Talbert, W. W., care of Union Switch & Signal Co., Chicago, Ill.
Taylor, A. A., Fairbanks, Morse & Co., Chicago, Ill.
Thomas, L., Res. Mgr., General Railway Signal Co., Chicago, Ill.
Thompson, H. G., Prin. Asst. Engr., Federal Signal Co., Albany, N. Y.
Thompson, H. G., Mgr., R. R. Dept., Edison Storage Battery Co., Orange, N. J.
Thomson, J., Jr., General Railway Signal Co., Rochester, N. Y.
Thurber, G. P., Gen. Mgr., Gray-Thurber Train Control & Signal Co., Pittsburgh, Pa.
Underhill, J. Delmar, Salesman, The Okonite Co., New York, N. Y.
Van Hook, W. A., Asst. Engr., Ill. R. R. & Warehouse Com., Chicago, Ill.
Vogel, E. W., Sig. Eng., Railroad Supply Co., Chicago, Ill.
Wallace, H. A., Engr., Union Switch & Signal Co., New York, N. Y.
Walters, G. L., Adams & Westlake Co., Chicago, Ill.
Ware, H. C., Supt. of Constr., Federal Signal Co., Chicago, Ill.
Whall, F. R., Gen. Mgr., C. H. Whall Co., Boston, Mass.
White, F. J., Salesman, The Okonite Co., New York, N. Y.
Wiley, J. R., Mgr., Standard Underground C. Co., Chicago, Ill.
Winchell, B. L., Jr., Western Sales Mgr., Kerite Ins. Wire & Cable Co., Chicago, Ill.
Wreaks, Hugh T., Secy., Wire Inspection Bureau, New York, N. Y.
Wuerpel, M., Jr., Asst. Gen. Mgr., General Railway Signal Co., Rochester, N. Y.
Young, W. J., Kerite Insulated Wire & Cable Co., New York.

DINNER TO APPLIANCES ASSOCIATION OFFICERS.

The officers and directors of the National Railway Appliances Association were the guests of A. P. Van Schaick, president of the association and district sales agent of the Lackawanna Steel Company, at a dinner last night at the Union League Club. Following the dinner there was an informal discussion of the association's past and future work. There were present as Mr. Van Schaick's guests: T. R. Wyles, L. R. Ashhurst, Jr., W. H. Baldwin, Philip W. Moore, C. W. Kelly, N. M. Hench, H. M. Sperry, John N. Reynolds, Bruce V. Crandall and T. W. Snow and Robert E. Belknap, past presidents. In honor of the day the table decorations were shamrocks imported direct from the "ould sod" and green flowers, and the menu was typical of the day.

VISITORS FROM FAR-AWAY PLACES.

The fact that Chicago is a good convention city, on account of its central location, is shown by the large attendance of signal engineers and signalmen from far distant points. C. R. Hodgdon, signal engineer of the Canadian Pacific; J. H. Cormick, signal engineer of the Canadian Northern; E. W. Newcomb, signal engineer of the Oregon Short Line; A. H. McKeen, signal engineer of the Oregon-Washington Railroad & Navigation Co., Fred Stuart, signal engineer of the Sunset Lines, and "Bob" Morris, signal engineer of the El Paso & Southwestern, are present from the far west and the south. Charles Kelloway, signal engineer of the Atlantic Coast Line; Chas. Stephens, from the Chesapeake & Ohio, and W. J. Eck, signal engineer of the Southern are present from the far southeast. And almost all of the New York and New England contingent are among those present.

HOW TO GET TO THE COLISEUM.

In order to make it possible for all railway men in attendance at the conventions to reach the Coliseum quickly and easily when they desire to see the exhibits, three large 16-passenger motor buses are kept in continuous operation between the Congress hotel and the Coliseum, between 10 a. m. and 10 p. m., each day up to and including Friday. These cars are for the exclusive use of the guests of the National Railway Appliance Association without charge, the drivers being instructed to honor N. R. A. A., A. R. E. A. and R. S. A. badges or passes to the Exhibition. Railway passes also are honored. The cars leave the Congress street entrance to the hotel and the main entrance to the Coliseum at intervals of about five minutes and make stops at the Blackstone hotel whenever passengers desire.

ADMISSION TO THE COLISEUM.

A new departure has been made this year in the method of admission to the National Railway Appliances exhibit at the Coliseum. In previous years complimentary tickets have been freely issued, but those not possessing these passes could purchase tickets at the door. This year no tickets are sold and a sign is placed on the entrance stating that the display is for railway men only. Complimentary tickets have been distributed more widely than before, but if any railway man has not received a ticket his pass or his American Railway Engineering Association membership badge will admit him. The aim is to exclude the general souvenir hunting public and confine the show to those directly interested, in this way enabling both the railway men and the exhibitor to gain the desired ends most effectively.

NATIONAL RAILWAY APPLIANCES ASSOCIATION.

The National Railway Appliances Association, which has to do with the destinies of the railway supply fraternity at these annual gatherings, is one of the very few associations of its kind that enjoy the dignity of being regularly incorporated bodies. It was organized under the laws of Illinois in April, 1911, and succeeded the Road and Track Supply Association.

The chief function of the association is to organize and conduct the splendid exhibition of railway appliances that is now held at the Coliseum and First Regiment Armory every March in connection with the annual convention of the American Railway Engineering Association and the stated meeting of The Railway Signal Association.

A. P. VAN SCHAICK,
President.

The officers and members of the board of directors of the National Railway Appliances Association are: President, A. P. Van Schaick, Lackawanna Steel Company, Chicago; Vice-President, T. R. Wyles, Detroit Graphite Company, Chicago; Treasurer, John N. Reynolds, Railway Age Gazette, Chicago; Secretary, Bruce V. Crandall, Chicago; Honorary Director, Robert E. Belknap, the Pennsylvania Steel Company and Maryland Steel Company, Chicago; H. M. Sperry, General Railway Signal Company, Rochester, N. Y.; Philip W. Moore, the P. & M. Company, Chicago; N. M. Hench, Carnegie Steel Company, Pittsburgh, Pa.; C. W. Kelly, Fairbanks, Morse & Company, Chicago; L. R. Ashhurst, Jr., William Wharton, Jr., & Company, Inc., Philadelphia, Pa.; and Walter H. Baldwin, the Adams & Westlake Company, Chicago. The photographs of all eleven are reproduced herewith.

T. R. WYLES,
Vice-President.

President Van Schaick has been district sales agent of the Lackawanna Steel Company at Chicago for the last three years. Prior to that, and for five years, he was president of the W. K. Kenly Company, Chicago, dealers in railway supplies. His first position of importance in the railway supply industry was with the Pittsburgh Plate Glass Company. He was identified with the sales department of

C. W. KELLY.

L. R. ASHHURST, JR.

W. H. BALDWIN.

H. M. SPERRY.

ROBERT ERNEST BELKNAP.

N. M. HENCH.

BRUCE V. CRANDALL,
Secretary.

P. W. MOORE.

JOHN N. REYNOLDS,
Treasurer.

OFFICERS AND DIRECTORS OF THE NATIONAL RAILWAY APPLIANCES ASSOCIATION.

that concern in Chicago for four years before going with the W. K. Kenly Company.

T. R. Wyles, vice-president, is a director and second vice-president of the Detroit Graphite Company, with office in Chicago. He is a Canadian by birth, and was just 41 years old on January 14 last. After leaving school, and until 1891, he worked in various capacities in Richmond, Va., and St. Louis, Mo. From 1891 to 1896 he was a stenographer in the purchasing department of the American Refrigerator Transit Company at St. Louis, and during the latter year was transferred to Chicago as contracting freight agent of the company. He resigned in 1897 to become agent for the Detroit Graphite Company and was made second vice-president in 1907.

THE EXHIBIT.

The four previous exhibitions of railway appliances given by the National Railway Appliances Association have set such a high standard of excellence that it would be difficult to commend the fifth annual exhibition now in progress at the Coliseum and the First Regiment Armory more highly than to say that it equals any of the four that preceded it. There is probably no basis of comparison which would be unfavorable to the 1913 "show" and in some ways it is declared by the exhibitors and railway men in attendance to establish a new record.

The floor area occupied is the same as last year, including the main floor of the Coliseum, the Coliseum Annex and the First Regiment Armory. The number of companies exhibiting is also practically the same as last year. The success of any exhibition of this kind, however, depends more on the character of the individual exhibits than on the aggregate space occupied or the total number of companies represented; for the visitors in increasingly large proportions are the men who buy and use the materials exhibited. Such men feel that the time spent in examining the devices shown is profitable to the extent that they receive new ideas or are set thinking along new lines. Realizing the "show me" attitude of the men in attendance, practically all of the companies prepare educational exhibits. Reception booths with beautiful decorations and comfortable chairs are even less in evidence than in former years and full-size samples, operating models, stereopticon exhibits or collections of photographs are present in nearly every booth. The plan of locating most of the large track work exhibits in the Armory which was successfully adopted last year has been followed in the assignment of space this year with the result that both the companies going to the Armory and those remaining in the Coliseum are benefited.

As has always been the case, the signal supply companies occupy much space, while not many important new developments in signal mechanism and interlocking machines are shown, a good deal of attention is being paid to the accessory devices, and exhibits of all the necessary mechanisms for complete signal installations are shown.

Water service men should find much of interest, for tanks, water softeners, stand pipes, and oil engines for pumping service are prominently displayed. While the oil engines are a comparatively new development, there are four types on exhibit. Practically every motor car manufactured for railway use is shown, including both the complete cars of special designs for various purposes and hand cars equipped with a gasoline engine. Bridge and building department officers are interested by the exhibits of paint, roofing, and insulating materials, doors and hangers. The office engineer and designer are appealed to by the makers of rules, calculators, draughting and blue printing supplies, while the field engineers find instruments, tape and other necessary field equipment. Two exhibits include steel bunks of improved design which should be appreciated by men who are finding it advisable to give laborers better accommodations in order to hold them.

As usual, several full-size switch layouts are shown, while steel and concrete ties in a variety of designs, tie plates, rail anchors, screw spikes, rail joints, switch stands, derails and other devices are present in abundance.

In general appearance, the first glance over the Coliseum or Armory shows little change from last year's exhibition. For the third time, flags and bunting are used exclusively this year for roof decoration in the Coliseum, while the memory of St. Patrick is honored by the green in the ceiling decorations of the Armory. The central feature of the Coliseum is a pagoda of ornamental design covering four drinking fountains, which are both convenient and sanitary. Music is provided during the afternoon and evening by the Ellis Brooks band.

The opening of the exhibits was announced for Saturday morning and while the crowd on Saturday was not large, all exhibits were in place by noon of that day, so that the visitors on Monday were not annoyed by the trucking of machinery into the booths and the preliminary setting up of which precedes any working exhibit. The crowd Monday was always there and by posting a sign at the main entrance "No admission to the public; for railway men only," and by refusing to sell tickets, the officers of the association assured the exhibitors the presence of the class of visitors that they most want to see.

THEY WILL BE ELECTED.

The Nominating Committee of the Railway Signal Association held a meeting at the Congress hotel last night. The names of the nominees for the various offices is a profound secret. But it is known that, whoever they are, they will be elected, as usual. A. R. Fugina, signal engineer of the Louisville & Nashville; H. S. Balliet, assistant manager of the Grand Central Terminal, New York; G. W. Hulsizer, signal engineeer of the Chicago & Alton, and Bert Howland, of the Missouri Pacific, were the members of the committee present.

WIRELESS EXPERIMENTS ON THE LACKAWANNA.

The Delaware, Lackawanna & Western is planning the installation of wireless telegraph apparatus at the stations in Scranton, Pa., and Binghampton, N. Y., with a view to testing the feasibility of the wireless telegraph for train dispatching purposes, and for communication between moving trains and stations. The Union Pacific has been experimenting in this direction for some time, but as yet has come to no definite conclusions on the subject.

A WESTERN SIGNALMAN GOES TO AN EASTERN ROAD.

J. E. Saunders, assistant signal engineer, Atchison, Topeka & Santa Fe, has resigned to become office engineer in the signal department of the Delaware, Lackawanna & Western, with headquarters at Hoboken, N. J. He assumes the duties of his new position on March 18, and reports to M. E. Smith, signal engineer of the Lackawanna.

C. A. MORSE GOES TO ROCK ISLAND.

Charles A. Morse, chief engineer of the Atchison, Topeka & Santa Fe system, at Topeka, Kan., has resigned that position to become chief engineer of the Rock Island Lines, with office at Chicago, effective on April 1. He succeeds J. B. Berry, who will remain in the service of the Rock Island

in a special and consulting capacity. Mr. Morse will be tendered a complimentary dinner by officials of the Santa Fe at Topeka on Saturday. A committee consisting of C. F. W. Felt, chief engineer of the A. T. & S. F. railway, R. J. Parker, general superintendent, and E. L. Copeland, secretary and treasurer, is in charge of the arrangements. Mr. Morse has been chief engineer of the system since November, 1909, and was previously chief engineer of the lines east of Albuquerque. He has been with the Santa Fe since January, 1886.

TWO A. R. E. A. SUB-COMMITTEE MEETINGS.

The sub-committee on poles, of the power distribution committee of the American Electric Railway Engineering Association, will hold a meeting on Wednesday, March 19, at the offices of Ralph H. Rice, assistant engineer for the Board of Supervising Engineers, in the Borland Block, La Salle and Monroe streets, Chicago. The sub-committee on rubber insulated cable, of the same committee, will hold a meeting at the same place on Thursday, March 20. Mr. Rice and Gaylord Thompson, chief engineer of the Ohio Electric Railway, are members of both sub-committees, and Mr. Thompson is also a member of the A. E. R. A. Joint Committee on Block Signals.

ART AT THE COLISEUM.

Something happened to the wall back of an exhibit at the north end of the Coliseum. It looked like a radiator had leaked upstairs. Various ways of improving the appearance of the space were suggested. One man wanted to put a frame around it and give it a name, claiming that it was a perfect facsimile of the famous Futurist-Impressionistic picture, entitled "Harvesting the Tie-Treating Plants." Finally the trouble was settled by getting a real painting, in oil, to fit the space. The painting is worth seeing. It is at the north end, just left of the middle of the wall.

SECOND-CLASS APPLICATION FOR R. S. A.

The Railway Signal Association has made application for entry at the post-office at Bethlehem, Pa., under the second-class privilege for its publications. This, if it is secured, will cut the postage bill down to one-eighth of what it is at present. It is a good move, and Secretary C. C. Rosenberg is urging the members to support it by paying their dues while they are here this week. Uncle Sam requires the dues to be paid in advance in order to obtain the second-class privilege.

ILLINOIS CENTRAL MEN AT THE COLISEUM.

Arrangements have been made by the Illinois Central for all roadmasters, supervisors and water service men, who can get away from their duties, to spend at least one day at the Coliseum. This includes all men on the system as far south as New Orleans and as far west as Omaha.

CHICAGO ENGINEERS' CLUB INVITATION.

The Chicago Engineers' Club extends to all visiting members of the A. R. E. A. the courtesies of the club which is located at 314 Federal street.

JOINT COMMITTEE MEETING.

Committee 1, of the Railway Signal Association, and Committee 10, of the American Railway Engineering Association, will hold a joint meeting at 6:15 Tuesday evening, in Club Room 6, at the Congress Hotel. The membership of these committees is practically identical. Committee 10 will submit this morning the same report on uniform signaling practice that was presented to the Railway Signal Association last fall, and was adopted by letter ballot of that organization by a vote of 746 to 10.

PRESIDENT'S DINNER.

An informal dinner was given to the officers, directors and committee on Arrangements of the A. R. E. A., by the president, Chas. S. Churchill, in the English room of the Congress hotel.

THE STRAUSS DIRECT LIFT BRIDGE.

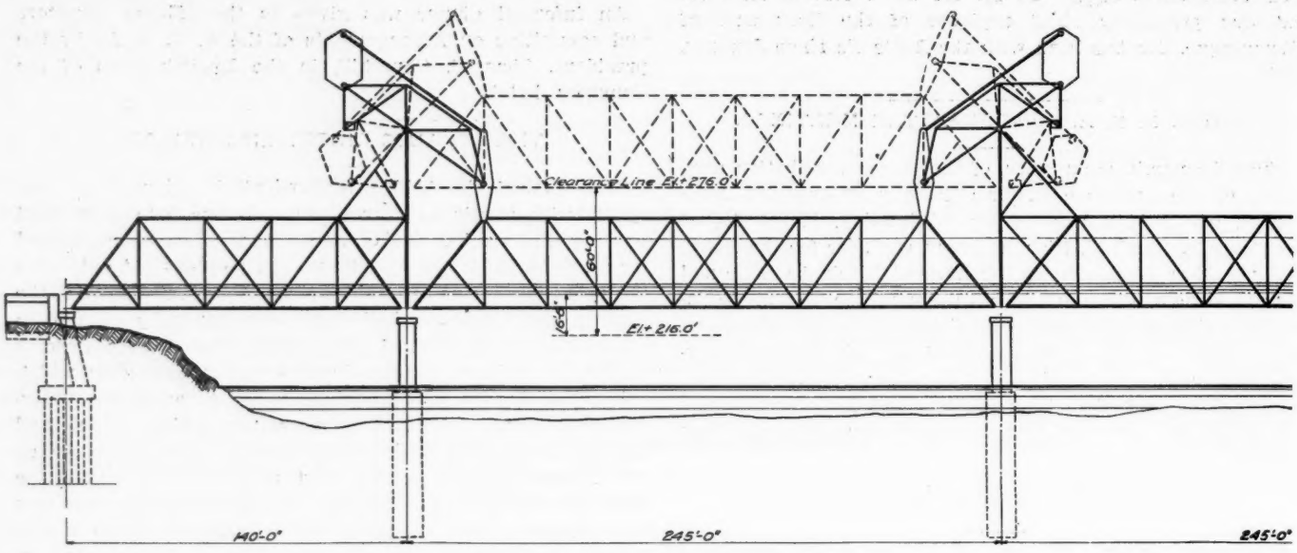
The vertical lift bridge is particularly adapted to long spans, with a relatively small lift. It has long been used in a small way, but during recent years, has been adopted for a number of larger structures. To do away not only with the operating cables and cable-driven locks, but also with the counterweight cables, which have been generally adopted in other designs of vertical lift bridges, the Strauss Bascule Bridge Co., Chicago, has developed a vertical lift bridge which substitutes for the counterweight cables a series of counterbalanced levers, and for the operating cables a rack and pinion drive. This design is of the same general type as the modern bascule bridge, and possesses essentially the same characteristics. The Strauss Co. does not urge the new design as a substitute for the bascule, but believes that the direct lift type has special advantages under certain conditions and will be capable of a wide application. Although it was put on the market only one year ago, three large railway bridges are already under construction, which will have movable spans of this type, one other is under contract and still others are proposed and awaiting final decision.

The Arkansas river bridge, near Pine Bluff, Ark., is to be used by the St. Louis Southwestern and an electric road, and carries, in addition, two roadways and two sidewalks. The movable span has a length of 245 ft. and a weight of 500 tons, the height of lift being 50 ft. This bridge is designed to open in one minute, the lifting apparatus being interchangeable to any span. The Chicago, Burlington & Quincy bridge over the Illinois river at La Salle, Ill., is a single track span 150 ft. long, with a height of lift of 32 ft. In this case an old span will be converted into a lift bridge without interruption to traffic. The Fraser River bridge at Fort George, B. C., for the Grand Trunk Pacific, is a single track span, 105 ft. 6 in. long, carrying, in addition to the railroad, two 12 ft. highways. This bridge has a lift of 40 ft. The Northern Pacific bridge over the Steilacoom Creek Waterway in Washington, which is under contract, is a double track span 96 ft. long, with a lift of 43 ft. In this design the towers are connected above the clearance line by a cross channel strut.

One of the claims in the patent covering the new Strauss design describes it as one "comprising a vertical movable span, fixed supports at each end of said span, a plurality of pivoted levers at each end carried by said fixed supports and connected with said span so as to move it vertically when the levers are moved." This broad claim covers practically any construction of a lift bridge employing rigid arms or links in place of cables or chains. This allows various types to be designed, and the possibilities of meeting special conditions are evident. Among these types are included a single tower design in which the entire operation is effected from one end, as in a single leaf bascule; an underneath counterweight design in which all the operating parts are beneath the roadway corresponding to a deck bascule, and the suspension lift design in which the lifting trusses form part of a suspension system which carries the live load. This latter bridge is not only economical, but is well adapted for long span structures of esthetic design.

The moving truss of the Strauss vertical lift bridge is a simple span with stiff chords, having a lifting mechanism at each end mounted on braced tower posts between which the span moves as it is lifted. The lifting mechanism is the usual parallel link mechanism of the Strauss bascule, with the addition of a hanger connecting this mechanism to the

Since the hangers support the movable span at points between the ends of the span, the span length for dead loads is reduced. This also permits the erection of the span in the open position without the use of falsework, as the hanger points can be used as points of support from which the two halves of the span can be erected as cantilevers. If an old



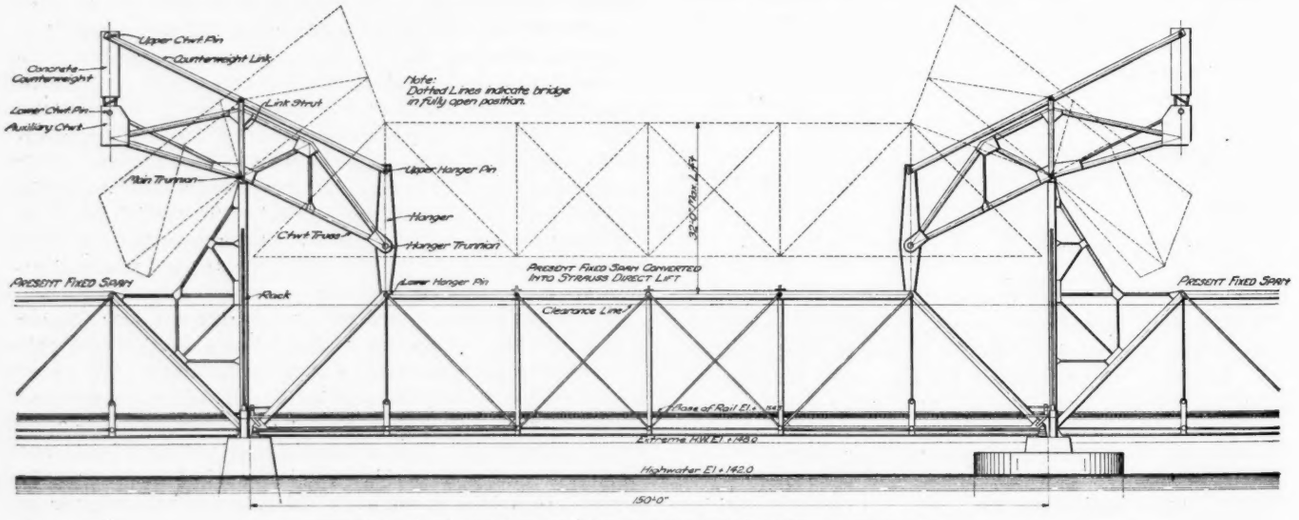
Elevation of Arkansas River Vertical Lift Span.

span. The details of frame, links and trusses are exactly the same as those used in the Strauss heel trunnion bascule type. The center of gravity of the counterweight at each end of the span moves in a vertical line, thus exerting a constant moment and maintaining the span in exact balance in all positions. There are no unbalanced horizontal forces. A secondary fixed counterweight on the lifting frame brings the center of gravity of this frame into coincidence with its fulcrum, so that there is no unbalanced moment.

The operating mechanism comprises a rack on each tower

span is in existence at the site, it may be retained in service, while the new span is being completed above it. The other methods of erecting movable spans as on falsework or by floating are, of course, applicable to this design, but when it is necessary to erect it in the open position, the fact that this can be done without the use of expensive steel falsework is an evident advantage. It is also possible to erect each tower and each half of the moving span individually and connect them together subsequently.

The equilibrium of the moving parts of the bridge is

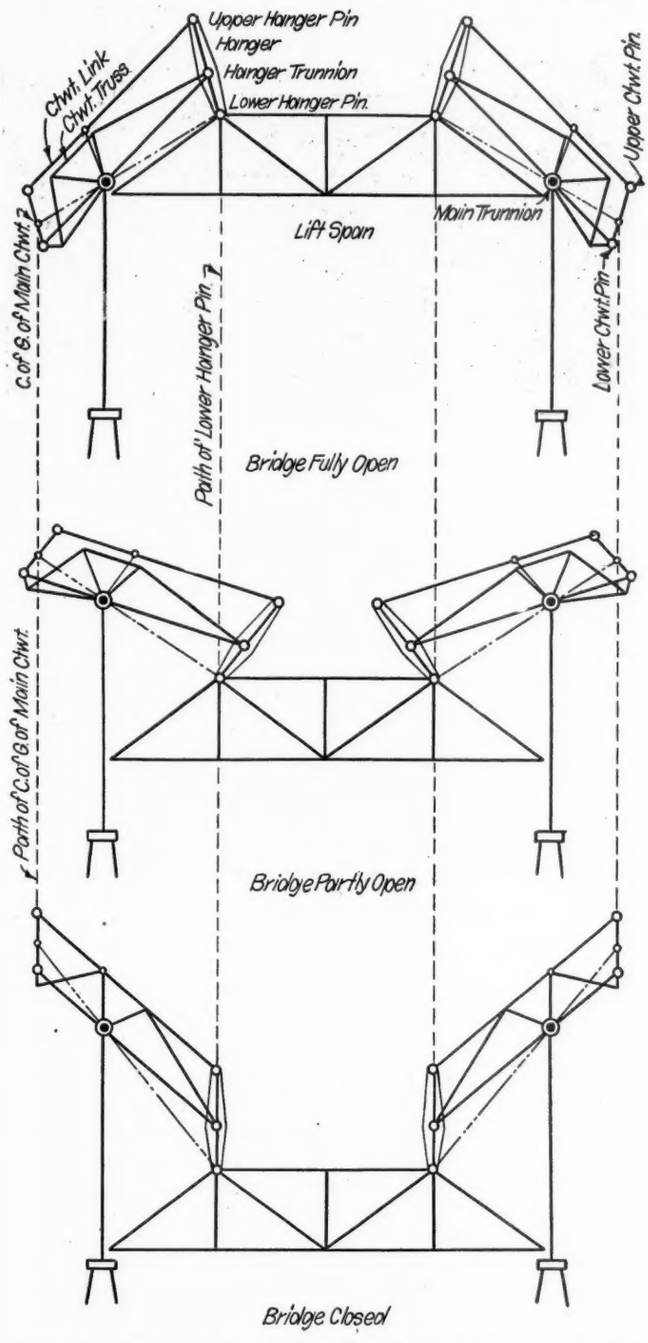


Elevation of Strauss Direct Lift Bridge for C., B. & Q.

post with corresponding pinions on the span, the motors and gearing also being located on the span and connected through an equalizing shaft, so that the four corners of the span move together at all times. The operator's cabin may be located either on the span or on the fixed portion. The end lock used in the single leaf bascule bridges is applied to each end of the vertical lift span, and is controlled from the operator's cabin.

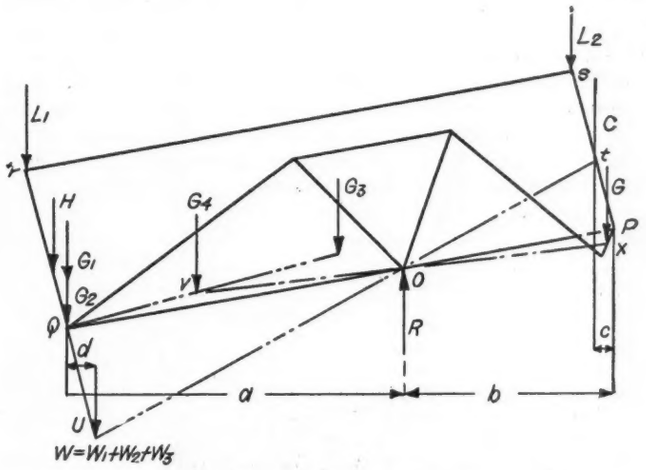
demonstrated in the line drawing shown herewith. The conditions for perfect balancing are: First, that the moment of all the weights about the fulcrum O must equal zero for all positions of the bridge, and, second, that the moment of the main counterweight and one-half the link at s about the point P must be equal and opposite to the moment of one-half the span, the hanger and one-half the link at r about the point Q. To demonstrate the equilibrium, let W equal the weight of

one-half the lift span, H the weight of the hanger, and L the weight of the link. It is assumed that the weight W is divided into three portions, the first W_2, of such a magnitude that when combined with L_1, one-half of the weight L which acts at the point r, the resultant of W_2 and L_1 or G_1 will be applied at the point Q. The second portion W_3 of the weight W, is of such magnitude that when combined with the weight H, the resultant of W_3 and H or G_2 will also be



Three Positions of Strauss Vertical Lift Bridge Illustrating Movement of the Parts.

applied at the point Q. The third portion W_1 of the weight W, is assumed as acting at the point U, which is the connection of the hanger to the moving span. The forces W, L_1, and H are then considered as being replaced by an equivalent system of forces composed of W_1 at U and $G_1 = L_1 + W_2$ and $G_2 = H + W_3$ acting at Q. If G_3 is the weight of the counterweight truss, the resultant of G_1, G_2, and G_3 will be a force G_4 equal to the sum of the other three and applied at their center of gravity, v. The auxiliary counterweight G is applied at a point x on the line vO extended, its weight being such that its moment about the point O balances the moment of G_4 about that point. The main counterweight C_1 is applied at such a point and is of such magnitude that when combined with L_2 the resultant C of C_1 and L_2 is applied at the point t on the line UO extended, the moment of this force about the point O being equal to the moment of W_1 about the same point. From similar triangles, $\frac{c}{d} = \frac{b}{a}$, and from the fact that the moment of C about the point O is equal to the moment of W_1 about that point, it can be shown that $\frac{W_1}{C}$ also equals $\frac{c}{d}$. From this equation $W_1 \times d = C \times c$. Since G_1 and G_2 are applied at the point Q and have no moment about it, the condition of equilibrium between the moments of W, H and L_1 about Q, and of C_1 and L_2 about p, is realized. Since the moment of all the forces about O has been made equal to zero, both conditions of equilibrium are therefore realized. The system of forces is made up entirely of vertical forces, so that the main trunnion reaction R is ver-



Demonstration of Equilibrium of Strauss Vertical Lift Bridge.

tical. The hanger is capable of resisting bending, so that it can receive a vertical pin reaction at U and equilibrium can exist without a horizontal component of this pin reaction.

The principal advantages claimed by the designers for the Strauss type of direct lift bridge are as follows: The fixed trunnions and parallel link counterweight are of the same design as in the Strauss bascule. The bridge is free from binding and power loss, due to long sliding guidings. All four corners of the span move absolutely level. The design eliminates all cables, chains and equalizing devices. The points of wear and those requiring inspection are few and easily accessible. The operating parts are completely enclosed and protected from the weather and other extraneous influences. The operating machinery is direct acting, safe and dependable. Both the counterweights and lift span are integral parts of the structure and cannot break loose from their supports. All parts of the structure have the same length of life, eliminating such items of cost as cable renewals, while the annual cost of cable lubrication, maintenance and inspection is eliminated. The entire moving structure is balanced in all positions, resulting in a low power consumption. The supports of the lifting span at points between its ends reduce the dead load stresses and allow erection in the open position without falsework.

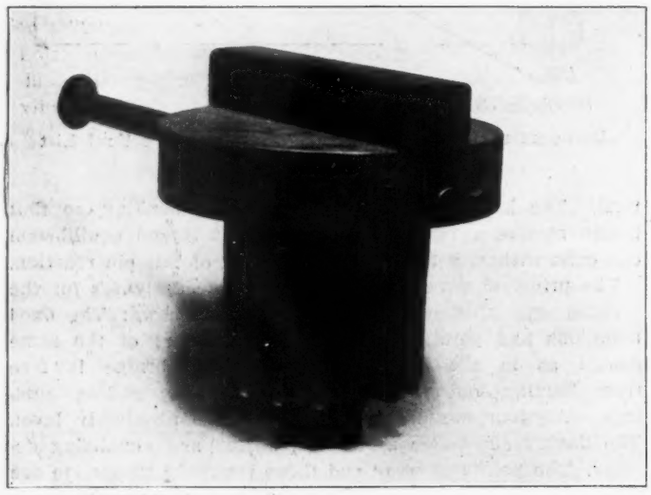
CONTINUOUS RAIL CROSSING.

The continuous rail crossing designed by the Alexander Crossing Co., Clinton, Ill., has been installed at two places, one of the crossings having been in service three years and eight months and the other one year and two months. In both cases it is stated that the operation of the crossing has given no trouble, the maintenance cost has been very much decreased and the shock to equipment passing over the crossing has been shown by tests to be much less than that occasioned by the crossing of the ordinary type.

The crossing is of very rigid construction, the foundation consisting of a solid slab of reinforced concrete 18 in. thick extending down 2 ft. 7½ in. below the base of rail under the entire crossing. This slab of concrete is covered with two layers of 3-in. oak timbers, over which a ½ in. steel plate, the exact size of the foundation, is laid. Under each rail intersection is placed a base casting having a total depth of 7 in., which incloses two layers of oak timbers. The ends of the main track rails and the intermediate or connecting rails are carried directly on these base castings. A number of bolts are embedded in the concrete foundation to hold the base plate and the castings firmly in place.

The continuous rail is secured by the use of crossing frogs consisting of 10-in. sections of rail designed to swing so as to come in line with either of the main track ralis. This revolving section is made of manganese steel and has a total height of $11\frac{7}{16}$ in., the portion below the head section being shaped to form a pinion, the hub of which has a bearing on the base casting. This pinion is provided with a cut spur gear to mesh with a spur rack which is operated by a pipe line from the interlocking tower. A bolt lock is provided to hold the revolving section firmly in place in line with either main track rail, these locks being also operated by pipe lines from the interlocking tower.

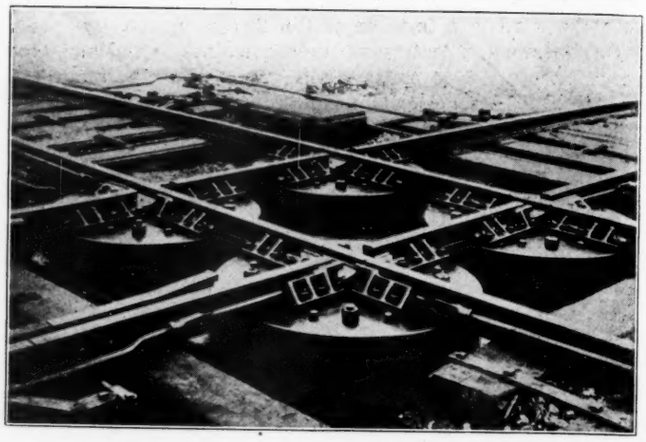
In addition to the revolving rails at each rail intersection, there are four intermediate sections of standard T rail to complete the crossing. These are held firmly in position on the



Revolving Portion of Alexander Crossing Frog, Showing Holes for Bolt Locking.

base castings by specially constructed angle bars of a very heavy section, the bolts which hold these bars being embedded in the concrete foundation. The full length main track rails can be carried up to the crossing, the end of each rail being supported on the base casting and firmly held by angle bars and bolts in the same manner as the intermediate rails. The main track rails are so rigidly attached to the base casting that expansion of the rail will not close the joint between the main track rail and the swinging rail, which would prevent the operation of the latter.

The first crossing of this type was installed at Thayer, Ill., at the crossing of the tracks of the Illinois Traction System and the Thayer Junction Railway, July 3, 1909. At the end of 19 months' service the cost of maintenance was reported by the companies using the crossing as less than $10. The Illinois Traction System operates 40 or more electric cars over this crossing daily and the Thayer Junction, three or four trains daily. The second crossing was installed at



Alexander Continuous Rail Crossing at Champaign, Ill.

Champaign, Ill., in the northbound main track of the Illinois Central at the crossing with the Cleveland, Cincinnati, Chicago & St. Louis. At this point there is a heavy traffic on both roads and all trains maintain a fair speed. There has been no delay to traffic on account of the operation of the crossing, even during the severe snow and sleet storms during the past two winters. About two months after the installation of this latter crossing, a test was conducted by the railway department of the University of Illinois, using the University test car to determine the comparative vibration caused by passing over the Alexander crossing in comparison with a crossing of standard type. These tests made it clear that there is very much less vibration and shock on the Alexander crossing. It is stated that the cost of maintenance for this crossing since its installation has been only 10 cents.

QUICK WEIGHING ATTACHMENTS.

BY F. E. KAEPPEL.

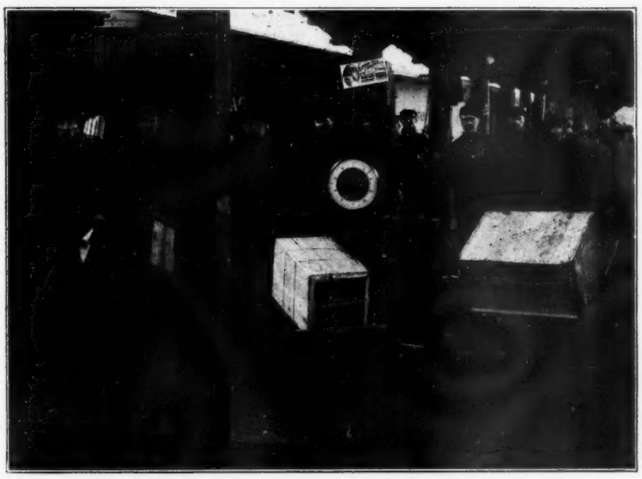
Several devices designed especially for the quick weighing of freight in local freight houses have been put on the market within the past few years. They are especially intended to eliminate the delays now incident to heavy weighing. When one stops to consider that weighing is so essential to the revenue of railways it is rmarkable that these developments have been delayed as long as they have. The manipulation of a scale beam by hand, the placing of the loose weights on the hanging poise, and other operations, cause a considerable loss of time and also give opportunity for errors.

These recent devices, commonly known as quick-weighing indicators, aim to relieve these conditions, and while they undoubtedly have not reached their final stage of development, they nevertheless possess enough merit to justify their installation in many large freight houses already. These machines are really attachments to the scales, and perform no work other than to indicate the weight on the scale levers, which was formerly accomplished by the scale beam itself. The advantages are apparent. In the first place, compare the delay in the old method of weighing in obtaining the balance and handling the weights as against the instantaneous action of the indicator. It has been estimated that the elimination of this delay alone may result in a saving of from 20 to 25 per cent in labor. However, the most important feature of the quick-weighing device is not the saving in time, but the increased accuracy. There has grown up a

system on many railways of accepting the shippers' weights on freight wherever stenciled without reweighing it, as the time consumed in reweighing does not justify the expense. With the quick-weighing indicator, however, the roads are now reweighing all freight received regardless of the shippers' weights and the size of packages. With an indicator properly working, it is practically impossible to obtain any except the correct weights, and the only way for an operator to make a mistake is to enter the figures incorrectly.

One interesting feature of these machines is the fact that results are obtained without the use of springs, and there is practically no oscillating on the part of the indicator. The capacity of these devices varies from 1,000 to 2,000 lb. on the dial, with an auxiliary beam to provide for the overweight to the full capacity of the scale. However, these auxiliary beams are seldom used in freight houses, where 90 per cent of the freight handled weighs less than 1,000 lb.

Five or six manufacturers have operating devices on the market, the general construction of which varies widely, but the method of obtaining the results of which are practically identical. Some of these machines are connected directly to the shackle of the scale levers, entirely eliminating the former beam equipment. Others are attached to the steel-yard rod, so that if the indicator is out of commission at any time, weighing can be continued on the beam as formerly. Among the present quick-weighing indicators are the Kron, Springfield, Streeter-Ammet, McFarlane, Fairbanks and Howe, all of which have been thoroughly tried out in this service.



Quick Weighing Indicator on a Freight House Platform Scale.

AN INTERESTING AND UNUSUAL ACCIDENT.

A short time ago a passenger train consisting of an engine, baggage car, mail car and two sleepers was derailed on a western road, and a 100-ton wrecker was sent out to clear the track. After working two or three hours an opposing passenger train appeared, and the wrecking outfit, consisting of an engine, convoy and wrecker, was ordered to a nearby passing track to let this train by. To reach this siding it was necessary for the wrecker to pass a through truss span. Owing to oversight on the part of the engineer, the boom of the wrecker was left up, and while running about 10 miles per hour this boom caught in the end of the bridge, pulling out the end portal and cross-bracing and lifting the span off the bridge seat after the engine and convoy had passed safely. The span dropped about 25 ft. into the creek below, carrying the wrecking outfit with it. Although six persons were on the wrecker, no one was injured.

This accident happened about 10 o'clock in the morning. The crew immediately started pulling the bridge apart and putting in a temporary track up the dump. With the assistance of two engines and a deadman, through which a line from the auxiliary hoist was attached, the wrecker was pulled up a 25 per cent. grade to the main track, and at 5 o'clock in the evening was again at work on the derailed engine of the passenger train. During all this time, even while the wrecker was in the stream, fire had been maintained under the boilers, and after it had been gotten back onto the main line, a careful examination showed that less than $5 worth of damage had been done to it.

Wrecked Bridge Before Pulling Wrecker Up Inclined Track.

This wrecker was made by the Industrial Works, Bay City, Mich.

HANDLAN'S RADIUS LENS SIGNAL LAMPS.

The Handlan radius lenses used in the signal lamps illustrated herewith were designed to impart the same amount of reflected light to observers viewing them from any position within the arc covered. The switch lamp is especially efficient for locations on curves. The spread of light not only covers an arc of 79 deg., but also radiates above and below the center line of the lens, thereby displaying clear indications on grades, and from stands located on tangent track in which the lamp has drooped over or is otherwise out of focus. These lamps are furnished with any combination of colors, can be constructed to hold either forks or staff, and are optionally equipped with either one-day or long-time burners.

Engine, Tail and Switch Lamps with Handlan Radius Lenses.

The engine lamps are equipped with green and white lenses, having an arc of 130 deg., the combined arc of a pair of these lamps upon a locomotive exceeding 225 deg. By this method employees are given the same uniform intensity of light regardless of their location. These lamps are adapted to be used on either side or front, and have an interior steel blind to obscure the lens not in use, which eliminates all expensive, intricate interior parts and colored glasses.

The tail end marker was designed to afford equal protection to rear ends of trains, both on tangent track and curves. These lamps are supplied with ruby radius lenses, covering an arc of 80 deg., and three standard 5-in. diameter lenses of any colors. They are equipped with one-day burners.

The engine lamp has been adopted as standard on the Frisco Lines, the Missouri, Kansas & Texas, the Mobile & Ohio and the Denver & Rio Grande, besides being tested at present on 24 other lines. The switch lamp is undergoing test on various lines, while some railways have purchased them in considerable quantities for use on curves. Sample lots of the tail lamps have been purchased by several lines for test. All of these lamps are equipped with Handlan's top draft ventilation, and are made by the Handlan-Buck Manufacturing Co., St. Louis, Mo.

A NEW FLEXIBLE HOSE.

Users of hose or flexible connectors for steam and pneumatic service would welcome a high pressure hose that would not kink, flatten, puncture or collapse at inopportune moments. A new coupling known as the J-M Flexible Metallic Combination Hose is said by the manufacturers to fulfill these conditions. This connector consists of durable rubber hose, protected against outward injury by a stout metal armor. The armor is made in the form of a ribbon, with crimped edges, forming, when wound, a continuous, interlocking flexible spiral, which is said to be practically pressure-tight in itself, without the inner tube. As the interlocking construction of the spiral restricts the curvature, sharp bends are impossible. Consequently the inner tube cannot kink or flatten, and is always open to its full diameter, permitting an unrestricted flow of steam, gas or liquid.

Owing to its unusual strength, the armor is practically proof against damage from the outside. Service tests show that it will resist a crushing strain of 300 to 800 lbs. to each four turns of the spiral, depending on the size of the hose, while it is capable of withstanding the highest internal working pressures. It is claimed that this hose cannot be put out of service unless both the outer armor and inner tube are punctured at the same time. In case the armor is dented or jammed, it will still serve as an efficient protection to the inner tube, and can be restored to its original condition. The substantial construction of the armor permits the use of a much lighter inner tube than is ordinarily used. This means a decided saving when it becomes necessary to renew the rubber hose. The inner tube is never subjected to any pulling strain, as the armor is stretched to its maximum length before the former is inserted. All the working strain comes on the armor, which is tested to resist an end pull or thrust of 1,000 to 2,000 lb.

Another advantage of the new hose is that its exterior surface, unlike ordinary single types of hose, does not become excessively hot when used for steam service, drills, or blowing out boilers, and can therefore be more conveniently handled. There are no rough edges in the metal armor of J-M Combination hose to cut or chafe the inner tube—no cracks or spaces between the spirals to permit the tube to work out or blow through, and, as the exterior is smoothly finished, it cannot cut or scratch the hands.

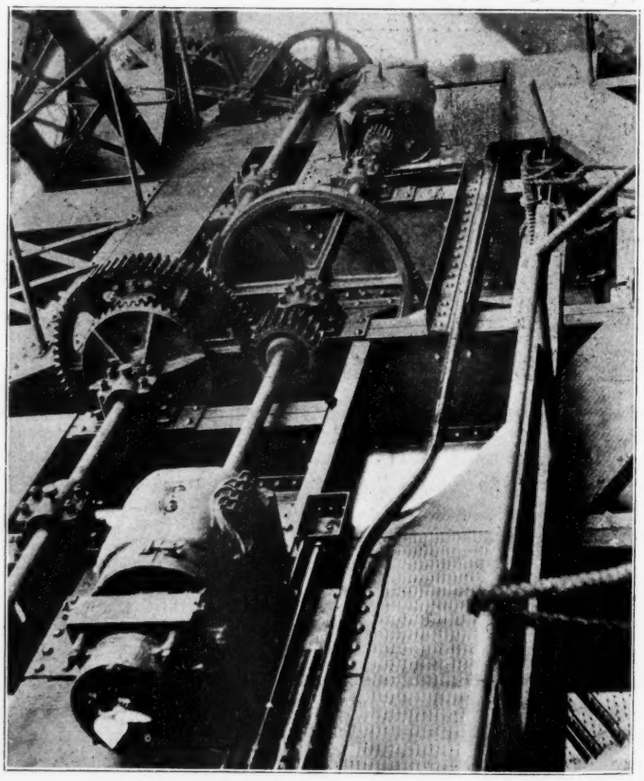
Specially designed couplings of malleable iron or brass are furnished with each length of hose. These couplings are virtually a union of three pieces: An outer sleeve into which the metal armor is threaded and riveted fast, the internal nipple, tapered on one end to fit tightly inside the inner tube, and the lock or binding nut, which serves to wedge the internal nipple well into the inner tube and hold it tightly against the inner walls of the outside sleeve. The outer end of the internal nipple can be furnished in male or female type, threaded to meet any standard requirement.

J-M Combination hose can be furnished in any length, any inside diameter up to 12 in., of any metal, and for all working pressures. It is also made with an inside pressure-tight metallic lining, as well as outside metal armor, for suction service, oils, etc. For boiler wash-out, round-house work and other places where steel would corrode, copper armor should always be used.

The H. W. Johns-Manville Co., New York, have published an interesting circular on this new coupling, which they will forward on request to anyone interested.

TWO MOTOR-OPERATED RAILROAD LIFT BRIDGES.

Practically all the railroad lift or draw bridges erected in the last few years, where electric current is available, are motor operated. Experience has proved that motors are fully as reliable as any other form of drive, and they are



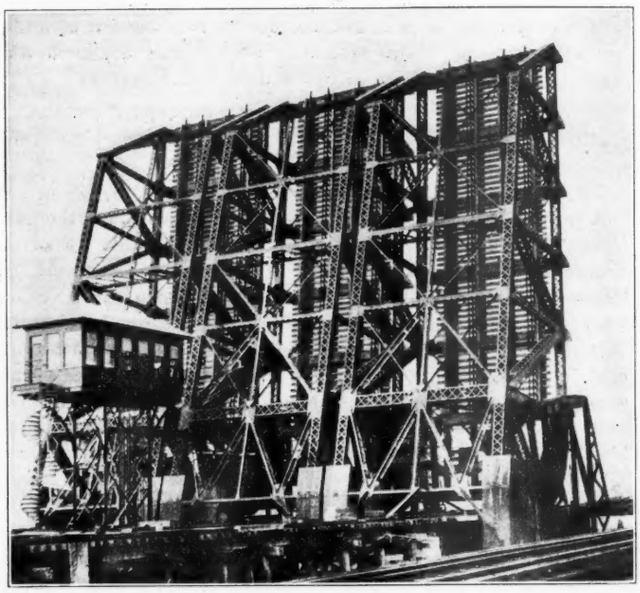
Motors Applied to Bronx River Bridge.

more economical, as there is no maintenance expense when the bridge is not being operated. The control of motors is also simpler than that of any other form of drive, and many protective devices can be installed.

Two interesting installations of motor-operated railroad bridges are those that carry the six tracks of the Harlem river branch of the New York, New Haven & Hartford over the Bronx and the Hutchinson rivers and over which approximately two hundred trains pass daily. Each bridge is made up of three leaves, each leaf carrying two of the six tracks. The Bronx river bridge is near the Westchester avenue station, and the Hutchinson river bridge is between

Baychester and Bartow stations. Both are the Scherzer type rolling lift bridges.

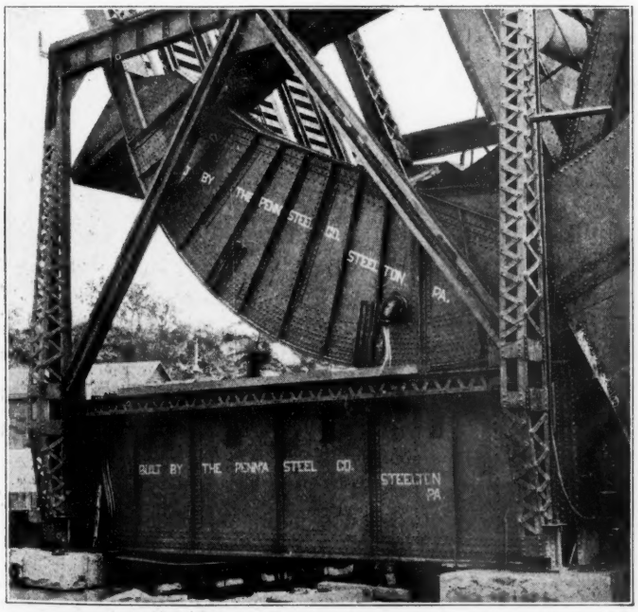
Since the channels spanned by these bridges are only about 100 ft. wide, the rolling lift construction was adopted, because this type requires no center pier and involves no obstruction or widening of the channel. The number of



Six-Track Scherzer Rolling Lift Bridge Across Bronx River.

daily openings varies, averaging five in the case of the Bronx river bridge during winter months and 12 during other months. The number of openings of the Hutchinson river bridge is less.

The complete electrical equipment is of Westinghouse make. Each leaf is operated by two 25 horsepower, 550 volt,



Method of Conveying Conductors to Moving Parts.

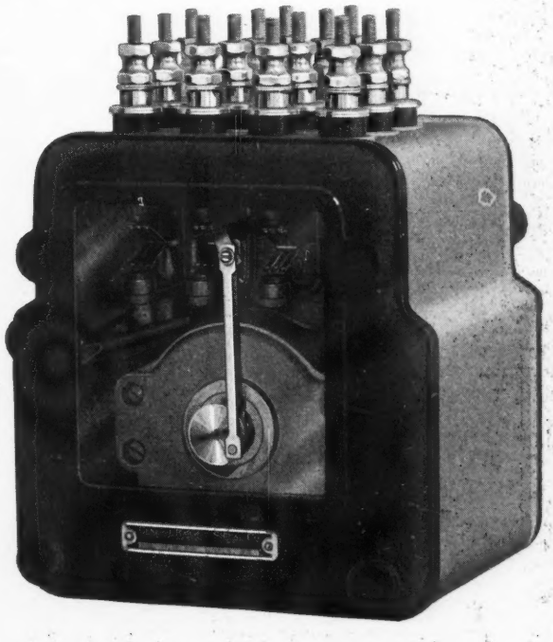
direct current motors, mounted on the moving leaf and geared to pinions which project from the side and mesh with racks on the stationary part of the bridge. Under ordinary circumstances the two motors on each leaf are operated together as one unit, but either can be controlled separately, and either has sufficient capacity to move its leaf, although, of course, more slowly than if the two motors were working together. Both motors are provided with electric brakes, and each leaf has a separate emergency brake.

The motors, brakes and other apparatus on the bridge itself are weatherproof, and designed for successful operation through an angle of 90 deg., through which angle the bridge moves vertically. The conduit carrying the current to the moving part of the bridge can be seen near the lower left-hand side of one of the photographs, passing to the under side of the roll-way, and, when the bridge is open, as shown, lying along a trench to the point where the conduit is carried up into the bridge itself. As the bridge swings down, the point where the cables enter the leaf moves upward, and the slack cable rises out of the trench.

The bridge is controlled from a tower. To open the bridge the signals are first set against trains, de-rails are opened, and bridge rail lock mechanisms are released. The controllers are then operated, and the upward movement of the bridge begins. At four points in its travel, signal lamps are lighted and bells are rung. If the power is not shut off when the leaves are at the proper height, a circuit breaker is tripped automatically. When the bridge is open, the navigation lights on the river change from red to green. The leaves are arranged in case of emergency to be manually operated by means of an endless chain over a wheel on the counter shaft. Considerable time is required for this, and it has never been necessary since either of the bridges were put into service.

THREE POSITION MOTOR RELAY.

The illustration herewith shows the new three-position direct current motor relay which has been designed by the General Railway Signal Company for use in wireless control automatic block signaling. The pickup, drop-away, contact pressure, and opening are the same as the G. R. S. model 9 tractive type.

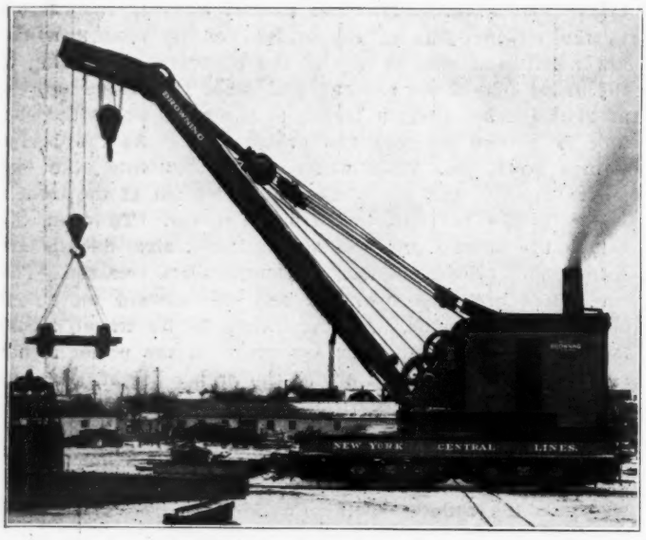


New Three-Position Direct Current Motor Relay for Wireless Signal Control.

For use in cut sections the track control is broken through one set of contacts only instead of through the neutral and polar contacts as when polarized relays are used. This means that the sections can be employed to as great a length as is possible with the ordinary neutral relays. Furthermore, this relay is much less subject to the influence of large flashes of current or lightning than any other form of polarized relay.

A LARGE RAILWAY STYLE WATER TOWER.

What is believed to be the largest steel tank on a short steel tower of a style commonly used by railways is being completed at Lakewood, O., a suburban city, close to Cleveland. It has a capacity of 560,000 gal. and height to bottom of tank of about 18 ft. The total height is 70 ft. and the diameter 46 ft. The bottom of the tank is constructed of compound curve, the largest radius of curvature being about 24 ft. The twelve columns are each supported by a pier 10 ft. square at base and 6 ft. high. No roof is used on this tank. The two balconies are for ornamentation and also for convenience in inspection. The initial cost of tanks of the size illustrated approximates five cents per gallon.



New Wrecking Crane for New York Central Lines.

This structure illustrates the tendency of engineers to abandon the steel stand pipe having a flat bottom resting on a masonry pier. A large portion of the cost of flat bottom stand pipes is included in the extra masonry required to support them. The water in the lower portion is usually not available for service and failures due to rustling out of metal sometimes occur. The structure shown was designed and built by the Des Moines Bridge & Iron Co., Pittsburgh, Pa.

LOCOMOTIVE CRANES IN THE CONSTRUCTION OF THE GRAND CENTRAL TERMINAL.

A large portion of the rock from the excavation for the new Grand Central Terminal, New York, was handled by seven cranes built by the Browning Engineering Co., Cleveland, O. These machines had been in constant use since the terminal work began, eight or nine years ago, and after the completion of the work will be sent to various yards for handling coal, cinders, etc. Some of the cranes are of 10 tons and some of 15 tons capacity, being equipped with booms of variable lengths. They were used to handle the rock after blasting, in most cases loading it onto flat cars.

These machines were particularly adapted to the handling of this rock, since in many cases the pieces resulting from the blasting were too large to be handled by a steam shovel dipper and the use of the cranes allowed these large rocks to be handled without further breaking. The cranes were also used to handle concrete into the forms and the cement, sand and stone around the mixing plants; also cinders, ties, rails and other heavy material throughout the course of the work. In the construction of the buildings, they were used to set the columns and girders and were frequently used for switching cars on the temporary tracks.

Browning Cranes Handling Rock Excavation for the New Grand Central Station, New York.

At the Coliseum

LIST OF EXHIBITORS.

The following is a complete list of all exhibits, in place or being installed, in the Coliseum and the First Regiment Armory. Spaces numbered from 1 to 212, inclusive, are in the Coliseum, and, unless otherwise indicated, the space numbers in the list are in the Coliseum. Exhibits in the Armory are so indicated:

Adams & Westlake Company, Chicago, Ill.—Signal lamps, railway hand lanterns, folding lavatories, car lighting fixtures, car baggage rack and car window devices. Represented by W. H. Baldwin, G. L. Walters, A. S. Anderson, C. B. Carson, W. J. Pierson, H. G. Turney, J. T. Ross, T. A. Galt. Spaces 83, 84, 102 and 103.

Ajax Forge Company, Chicago, Ill.—Manganese steel one-piece guard rail, Manganese frogs, guard rail clamps, adjustable switch rods and rail braces. Represented by F. B. Bradley, H. G. Elfborg and H. C. Hutchins. Spaces 230, 235, 236, Armory.

American Guard Rail Fastener Company, Philadelphia, Pa. —Vaughan automatic rail anchors, Vaughan guard rail clamps, anchor guard rail clamps, tie plate guard rail fasteners. Represented by David F. Vaughan and Charles Z. Vaughan. Space 119.

American Hoist & Derrick Company, Chicago, Ill.—American railroad ditcher. Represented by Frank J. Johnson, William L. Manson and C. C. Austin. Space 47.

American Lock Nut Company, Chicago, Ill.—Absolute lock nut. Represented by F. M. Bobo, B. A. Radcliffe, W. W. Smith, W. J. Hamlin, E. J. Murdock. Space 162.

American Rail Joint Company, Toronto, Canada.—Reinforced angle bars and rail joints. Represented by T. D. Beddoe. Space 148.

American Steel & Wire Company, Chicago, Ill.—Right-of-way fencing, galvanized steel fence posts, steel farm crossing gates, signal wire, switch ropes, telegraph and telephone wires, insulated wires and cables. Represented by J. W. Collins, B. H. Ryder, L. P. Shanahan, C. J. Boon, M. E. Evans, F. J. Conkling, J. W. Meaker, H. A. Parks and C. H. Knight. Spaces 261, 262, 267, 268, Armory.

American Vulcanized Fibre Company, Wilmington, Del.—Rail joint insulation, fibre plate, end posts, bushings, steel ties, shims and other fibre products. Represented by John Barron, C. C. Bell and J. H. Burn. Space 117.

Asphalt Ready Roofing Company, New York, N. Y.—Roofing materials, Hudson asphalt shingles, Protection brand roofing. Represented by H. H. Huested and W. A. Hemenway. Space 167.

Associated Manufacturers' Company, Waterloo, Ia.—Jerry boy section motor car, gasoline engines, magnetos. Represented by A. H. Ambrose and Alfred Grove. Space 161.

Atlas Preservative Company of America, New York, N. Y. —Descriptive matter of Atlas products, particularly Atlas "A" weed killer and track preservatives. Represented by R. N. Chipman and Jacob Kramer. Space 169.

American Valve & Meter Company, Cincinnati, O.—Poage automatic water columns and tank fixtures, Fenner drop spout, Anderson economy switch stands, interlocking switch stands and safety switch locks. Represented by J. T. McGarry and F. C. Anderson. Spaces 130, 131 and 132.

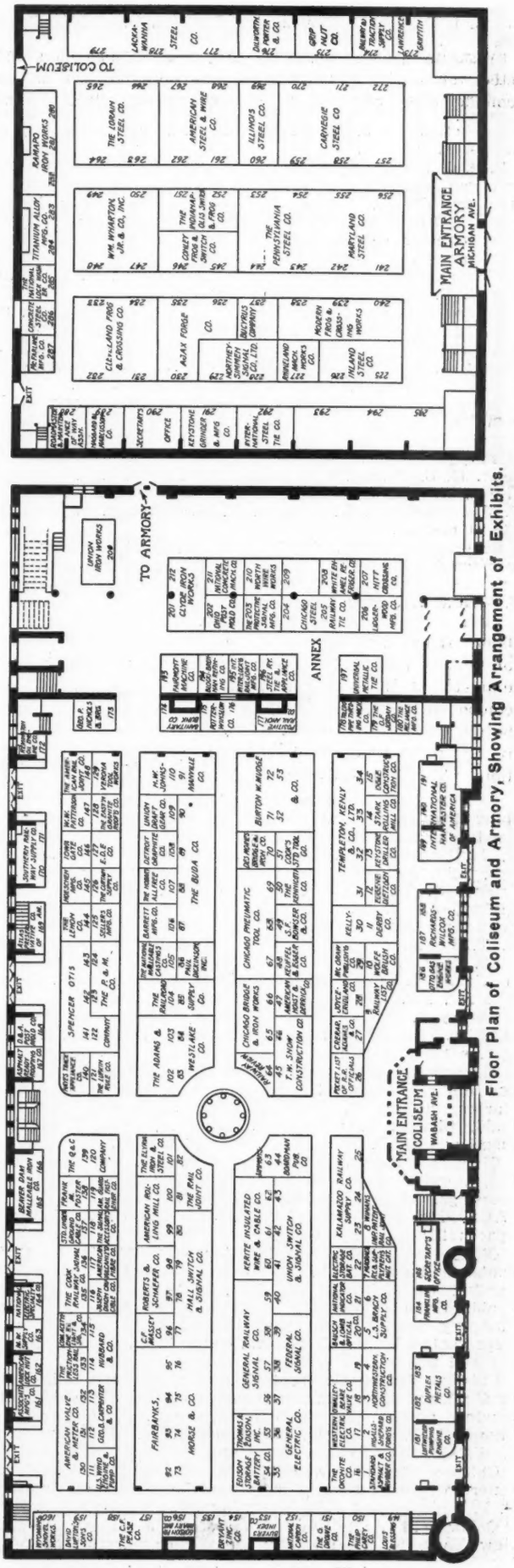
Barrett Manufacturing Company, Chicago, Ill.—Bridge waterproofing, Barrett specification roofs, Barrett Tarrok subfloors; Hydronon, the dampproofing paint, waterproofing for buildings. Represented by H. B. Nichols, W. S. Babcock, Henry Olmsted, Jr., B. B. Breder and J. J. Ross. Space 106.

Beaver Dam Malleable Iron Company, Beaver Dam, Wis. —Tie plates and rail braces. Represented by D. P. Lamoreux, Lawrence Fitch and Frank Bell. Spaces 165 and 166.

Bausch & Lomb Optical Company, Rochester, N. Y.—Engineers' and surveyors' instruments. Represented by W. Louis Johnson, Chas. A. Bengston and Harold D. Skelton. Space 20.

Blessing Louis, Jackson, Mich.—Reinforced concrete railway tie, "Safite" rail fasteners and noiseless rail joint. Represented by Louis Blessing and Fred M. Hall. Space 149.

Blocki-Brennan Refining Company, Chicago, Ill.—Carboxide Elastic Metal Preserver. To protect steel and iron structures against weather conditions, sulphur and acid fumes. Represented by Jas. C. Cleary, Glenn E. Plumb, W. F.



Floor Plan of Coliseum and Armory, Showing Arrangement of Exhibits.

Brennan, Gordon E. Douglas and Rudolph Braocker. Space 194.

S. F. Bowser & Company, Inc., Fort Wayne, Ind.—Oil storage systems, self-measuring and power-driven pumps, oil tanks large and small, gasolene storage, self-registering pipe line measures, oil filtering and circulating systems. Represented by J. L. Handy, W. T. Simpson and E. H. Briggs. Space 49.

L. S. Brach Supply Company, New York, N. Y.—Lightning arresters, insulating compounds, handy die stocks, railway crossing signals, Brach handy pipe vise, Brach hydrogrounds, Brach vacuum arrester testing sets, Brach lightning arrester cabinets, Brach iron arrester cases, Brach volt meters, solderall and solderall torches and Brach duplex shunts. Represented by L. S. Brach, A. G. Brach and H. E. Gifford, Jr. Spaces 5 and 6.

Bryant Zinc Company, Chicago, Ill.—Crossing signals, relays, channel pins, annunciators, Waterbury batteries, and Orangeburg fibre conduit. Represented by Stanley C. Bryant, J. P. Costigan, E. M. Deems, J. W. Cremerius, A. F. Klink and H. F. Worden. Spaces 154 and 155.

Buda Company, Chicago, Ill.—Motor cars, track drills, bumping posts, jacks, switch stands, car replacers, electric storage battery, shop truck, electric crossing gate, automobile engines, etc. Represented by H. C. Beebe, W. C. Dyer, H. S. Evans, R. B. Fisher, J. J. Gard, J. T. Harahan, Jr., L. Hamill, Wm. P. Hunt, Jr., E. Johnson, W. Krause, G. J. Slibeck, M. E. Towner, T. H. Wheeler. Spaces 87, 88, 89 and 90.

Bucyrus Company, South Milwaukee, Wis.—Pictures of locomotive piledrivers, steam shovels, drag line excavators, wrecking cranes and unloading plows. Represented by P. E. Dutcher. Space 237, Armory.

Buyers' Index Company, Chicago, Ill.—Publication "Railway Supply Index-Catalogue." Represented by Lloyd Simonson, Norman F. Rehm, Alex Smith, C. W. Cozzens, D. J. Beaton and F. B. Cozzens. Space 153.

Philip Carey Company, Cincinatti, O.—Carey Flexible cement roofing, ceilboard, Deco veneer, waterproofing materials, etc. Represented by Allan Wallace, J. E. Fitzpatrick, N. S. Kenney, E. P. Tingley and P. A. Johnston. Space 150.

Carnegie Steel Company, Pittsburgh, Pa.—Full set steel switch ties, United States steel sheet piling, steel wheels, gear blanks, axles, Duquesne rail joints, hot and cold worked splice bars, automatic stereopticon showing views of steel tie track and steel piling installations. Represented by N. M. Hench, L. C. Lustenberger, Robert Coe, C. F. W. Rys, John McLeod, John S. Unger, Edwin S. Mills, C. B. Friday, G. W. Landrus, G. E. Dix, H. van Zandt, C. E. Dinkey, J. W. Dix and H. D. Williams. Illinois Steel Company representatives: W. H. C. Carhart, George Baker, D. T. Buffington, H. L. Baker, D. E. Sawyer, H. C. Griswold, J. P. Walker, C. E. Haywood, W. J. Totten, T. W. O'Brien, J. B. Arnold, B. E. Hamilton and P. Carhart. Spaces 257, 258, 259, 260, 269, 270, 271 and 272 Armory.

George B. Carpenter & Company, Chicago, Ill.—Railway supplies. Represented by H. W. d'Evers and H. S. Hanson. Spaces 112 and 113.

Chicago Bridge & Iron Works, Chicago, Ill.—Steel towers and tanks. Represented by George T. Horton, Horace B. Horton, Robert H. Murray, Merle J. Trees, Elwood G. Ladd, Charles S. Pillsbury, Clinton M. Ladd, Kenneth I. Small and H. B. Murphy. Spaces 65 and 66.

Cleveland Frog and Crossing Company, Cleveland, O.—Frogs, switches, switch stands and rolled manganese rail crossings. Represented by George Stanton, L. G. Parker, W. S. Moore, George Arnold, Jr., and G. A. Peabody. Spaces 231, 232, 233 and 234.

Clyde Iron Works, Duluth, Minn.—One 8¼ in. by 10 in. double cylinder, double drum erectors' hoist with four independent winch heads; one 7 in. by 10 in. double cylinder, double drum contractors' hoist complete with bull wheel swinging gear, and various sizes of blocks and sheaves. Represented by A. E. Holcomb and G. P. Miller. Spaces 201 and 212.

Chicago Pneumatic Tool Company, Chicago, Ill.—Rockford railway motor cars, pneumatic and electric tools, rail bonding outfits, etc. Represented by C. E. Walker, J. C. Campbell, P. F. Flavin, M. O'Connor, W. F. Delaney and J. W. McCabe. Spaces 67, 68 and 69.

Chicago Steel Railway Tie Co., Chicago, Ill.—Steel and concrete railway ties. Represented by Walter R. Carmody, T. P. Inglesby and John Hemmingway. Spaces 204 and 205.

Commercial Acetylene Railway Light & Signal Company, New York, N. Y.—Flashing signals, commercial acetylene headlights, acetylene signal lighting, A. G. A.-Dalen signal devices, Oxy-Acetylene welding. Represented by C. E. Lee, H. G. Doran, E. T. Sawyer and F. A. Barbey. Space 134.

Concrete Steel Company, Chicago, Ill.—Reinforcing bars, safety tread and bar bending machines. Represented by Fred C. Harper, John G. Ralston and T. M. Davidson. Space 286 Armory.

Conley Frog & Switch Company, Memphis, Tenn.—Three designs of Conley frogs. Represented by J. E. Conley, F. W. Lange and J. W. Buzick. Spaces 245 and 246 Armory.

Cook Railway Signal Company, Denver, Colo.—Automatic block signals, automatic crossing gates and "Revivo" dry storage batteries. Represented by W. J. Cook, George R. Simmons, M. W. Breuer and N. Fallek.

Cook's Standard Tool Co., Kalamazoo, Mich.—Track drills, bonding drill, track tool grinders, chucks, drill bits, track jacks, car jacks and cattle guards. Represented by Eugene Cook, Walter Reynolds and E. B. Cook. Space 51.

Crerar, Adams & Company, Chicago, Ill.—Calumet heavy duty track drills, Eureka bonding drill, Hercules steel trucks, Calumet expanders, Shelby seamless steel tubing. Represented by Russell Wallace, W. J. Clock, C. J. O. Swift, W. H. Dangle, J. A. Martin, G. D. Bassett and T. W. Barrett. Space 27.

The Curtain Supply Company, Chicago-New York.—Ring 88 curtain fixture, Rex all-metal curtain rollers, Rex steel sash balance, vestibule curtains, including Rex release handle, Rex steel vestibule roller, No. 6 roller, vest hook, Rex vestibule curtain opening shield and C. S. C. O. diaphragms and fireproof hoods. Represented by W. H. Forsyth, S. W. Midgley, F. M. Egolf and Randolph Reynolds. Space 126.

D. & A. Post Mold Company, Three Rivers, Mich.—D. & A. cement fence machines, special molds for line, anchor and brace posts, D. & A. post manufactured by Pennsylvania Railroad Company, post reinforcements and fence fasteners. Represented by G. H. Dougherty, L. R. Dougherty, O. Dougherty and L. A. Dougherty. Space 168.

David Lupton's Sons Company, Philadelphia, Pa.—Steel sash and window operating device. Represented by C. P. Pond, R. A. Sanborn and G. J. Wagner. Space 159.

Des Moines Bridge & Iron Company, Pittsburgh, Pa.—Steel water towers, steel coaling stations, steel standpipes and novelty beam and tank calculator. Represented by W. W. Hendrix and A. C. Pearsall. Space 70.

Detroit Graphite Company, Detroit, Mich.—Paints for railroad service. Represented by T. R. Wyles, L. D. Mitchell, B. O. F. Randolph, A. H. Kuerst, E. Booth, J. J. Hogan and C. C. Potter. Space 108.

Eugene Dietzgen Company, Chicago, Ill.—A complete line of improved railroad transits and levels. Represented by C. E. Cole and G. C. Moore. Space 12.

Paul Dickinson, Inc., Chicago, Ill.—Smokejacks, Aeolus ventilators and cast iron chimneys. Represented by A. J. Filkins, J. A. Meaden, George M. Kenyon, Wm. H. Dayton, F. C. Webb and G. H. Vrooman. Space 86.

Dilworth, Porter & Company, Ltd., Pittsburgh, Pa.—Railroad spikes and tie plates. Represented by W. H. Schleiter and Joseph Dilworth. Space 276 Armory.

Joseph Dixon Crucible Company, Jersey City, N. J.—Dixon's silica graphite paint and graphite productions. Represented by H. W. Chase, R. R. Belville and F. B. Gibbs, Jr. Space 116.

Drouve Company, G, The, Bridgeport, Conn.—Skylights and window operating device. Space 151.

Duplex Metals Company, Chester, Pa.—Copper clad wire and accessories. Represented by C. B. Semple, W. T. Kyle, L. M. Gordon, R. C. McCall, Elgin Braine and B. F. Cameron. Spaces 182 and 183.

E. D. E. Company, Chicago, Ill.—Flaxlinum insulation for refrigerator cars, ice houses and fireproof Flaxlinum insulation for steel passenger cars. Represented by Frank M. Gilmore and Frank J. Burns. Space 127.

Eastern Granite Roofing Company, New York, N. Y.—Granite roofing, Evertite roofing, Tisbest roofing and Palmoid roofing. Represented by H. Henning, A. E. Roever and W. F. Sachs. Space 128.

Edison Storage Battery Company, Orange, N. J.—Storage batteries for railway signals, car lighting, telegraph and telephones. Represented by H. G. Thompson and George W. Daves. Space 54.

Edison, Thos. A., Inc., Orange, N. J.—Primary batteries. Model working exhibit, showing B. S. C. O. gravity and storage batteries working on track circuits. Represented

by E. E. Hudson, F. J. Lepreau, P. A. Garrity and E. McGall. Space 55.

Electric Storage Battery Company, Chicago, Ill.—"Chloride," "Tudor," "Exide," "Hycap" and "Ironclad-Exide" batteries to be used in car lighting, telephone, telegraph and signal operation; storage battery locomotives, central station batteries, commercial industrial trucks and operation of drawbridges. Represented by G. H. Atkin, T. Milton, H. N. Beck, R. J. Baird, T. A. Cressey and P. G. Downton. Space 22.

Elyria Iron & Steel Company and the Hart Steel Company, Elyria, O.—Tie plates and compromise rail joints. Represented by Guilford S. Wood, A. W. DeRocher, W. T. Bentz and J. H. Allen. Space 101.

Fairmont Machine Company, Fairmont, Minn.—Motor cars, bridge building, 4-speed cars, section and inspection car. Represented by F. E. Wade and H. E. Woolery. Space 193.

Federal Signal Company, Albany, N. Y.—Federal electric interlocking, Federal electromechanical interlocking machine, Federal switch guard, Federal top post signal mechanism, 3-position solenoid dwarf signal, Mercury time release, hand time release, track model, battery charging switch, switch box, etc. Represented by A. H. Renshaw, J. T. Cade, C. Hurze, H. G. Thompson, J. J. Hubbard, H. C. Ware, H. P. Ober, John Kelly, W. H. Richard and A. C. Dunne. Spaces 38 and 39.

Franklin Manufacturing Company, Franklin, Pa.—Franklin asbestos lumber smoke jacks, asbestos train pipe covering, "Franklin" 85 per cent. magnesia sectional boiler lagging, and cotton and wool waste. Represented by E. R. Rayburn, L. B. Melville, R. J. Evans and H. S. Hayden. Space 184.

The Frictionless Rail, Boston, Mass.—Rail for track curves. Represented by F. A. Barbey, J. W. Manama, S. W. Simonds, G. H. Bryant and T. F. Dwyer, Jr. Space 133.

Fairbanks, Morse & Company, Chicago, Ill.—Motor cars, combined oil engine and pump, 9 HP oil engine direct-connected to 5½ Kw generator, steam pump, cattle guards, scales, standpipe, bonding drill, chain hoists, double-acting deep well cylinder, electric motor, jacks—ratchet, hydraulic and ball bearing, Eclipse engine and trench pump. Represented by S. F. Forbes, A. A. Taylor, E. M. Fisher, L. H. Matthews, D. J. Higgins, F. M. Condit, J. L. Jones, F. H. Douglas, Geo. A. Akers, C. T. Fugivy, K. B. Brown, W. W. Adams, A. M. Fenwick, D. K. Lee, F. V. Roy, E. E. Pendray, L. Norvell and H. E. Vergosen. Spaces 92, 93, 94, 95, 73, 74, 75 and 76.

General Electric Company, Schenectady, N. Y.—Electrical equipment for steam railways and railway supplies. Represented by H. L. Monroe, W. J. Clark, A. W. Jones, F. Rhea, W. O. Kellogg, W. H. Coleman, J. Roberts, H. M. Jacobs, G. F. Gray, L. W. Shugg, A. P. Jenks, L. A. Crawford, C. H. Jones, B. F. Bilsland and H. K. Ferguson. Spaces 35, 36 and 37.

General Railway Signal Company, Rochester, N. Y.—Power signaling, consisting of electric interlocking using dynamic indication, alternating current block signals, A. P. Block system, Selective signal system for telephone train despatching, model 4 switch machine, 110-volt model A signals, direct-connected and base of mast types, model 2A dwarf signal, light signals, direct and alternating current, model 2A block signals, signal transformers, alternating and direct current relays and indicators, model 5 form A switch box, 3-position relays and signal accessories. Represented by W. W. Salmon, G. D. Morgan, M. Wuerpel, H. M. Sperry, F. W. Moffett, M. F. Geer, S. N. Wight, A. G. Moore, M. R. Briney, L. Thomas, C. O. Poor, F. H. Jones, W. K. Howe, F. L. Dodgson, W. S. Henry, J. H. Campbell, S. M. Day, O. A. Ross, L. B. Somerby, A. Thomson, L. E. Dodge and H. C. Frey. Spaces 56, 57, 58 and 59.

Gordon Primary Battery Company, New York, N. Y.—Gordon primary battery. Represented by O. S. Flath, G. A. Nelson and W. M. Kinch. Space 156.

Griffith, Lawrence, Yonkers, N. Y.—The Griffith shoulder tie plate insulated rail joint. Represented by Lawrence Griffith. Space 273, Armory.

Grip Nut Company, Chicago, Ill.—Grip lock nuts, grip holding nuts, monogram bolt fastener and the D. P. journal box dust guard. Represented by W. E. Sharp, Blake Hooper, E. V. Lea and C. Beaumont. Space 275, Armory.

Hall Switch & Signal Company, New York, N. Y.—Automatic signals, relays, switch boxes, electric interlocking machines, switch machine and auxiliary appliances used in signal work. Represented by W. H. Lane, W. J. Gallingham, Jr., H. J. Mullineaux, H. B. Taylor, H. L. Hollister, R. Connell, O. B. Frink and C. R. Sloan. Spaces 77, 78, 79 and 80.

Hayes Track Appliance Company, Richmond, Ind.—Hayes derails, models A, CX, E and H, with operating and target stands. Represented by S. W. Hayes, W. Harding Davis, E. L. Ruby, E. W. Brown, E. C. Knapp, J. McCulloch, Jr., Wellington B. Lee, Arthur Gemunder and F. C. Stowell. Space 140.

Hitt Crossing Company, Champaign, Ill.—Space 207.

Hobart-Allfree Company, Chicago, Ill.—Smyth and Freeland derailers, Newton car replacers, one eight-size model of piston valve cylinders. Represented by B. F. Hobart, E. H. Allfree, F. R. Cooper and W. H. England. Space 107.

Hoeschen Manufacturing Company, Omaha, Neb.—Mechanical highway crossing bells. Represented by H. Hoeschen, H. P. Ryner, A. H. Snedeker, R. A. Fry and George H. Fisher. Space 145.

Hubbard & Company, Pittsburgh, Pa.—Railroad track tools, shovels, spades and scoops, Pierce specialties, pole line material and washers. Represented by R. L. Mason and O. W. Youngquist. Spaces 114 and 115.

Haggard & Marcusson Company, Chicago, Ill.—Tiger steel bunks. Represented by Henry H. Marcusson. Space 289, Armory.

Indianapolis Switch & Frog Company, Springfield, O.—RNR solid manganese frog, "Indianapolis" manganese crossing, RNR frog crossing, "Indianapolis" portable electric welder, electric welded joints, reclaimed manganese frog and armor plated rail frog. Represented by E. C. Price, J. A. Foulks, W. H. Thomas and J. C. Jameson. Spaces 251 and 252 Armory.

Ingalls-Shepard Forging Company, Harvey, Ill.—Represented by W. E. Foster. Space 2.

Inland Steel Company, Chicago, Ill.—Open hearth steel products, tie plates, railway track bolts and track spikes, rivets, Vismera rust and corrosion-resisting iron sheets and products, concrete reinforcing bars, rail carbon, plain and hot twisted, medium open hearth steel, plain and cold twisted, steel barrels and steel fence posts. Represented by H. L. Hart, R. C. Coombs and A. C. Roeth. Spaces 225 and 226 Armory.

International Harvester Company of America, Chicago, Ill.—Oil engines and tractors for railroad construction work. Represented by A. F. Young and C. C. Mangrum. Spaces 189, 190 and 191.

International Interlocking Rail Joint Manufacturing Company, Chicago, Ill.—Interlocking rail joint (Barnhill joint). Represented by J. McWeeny, W. H. Lienesch and B. E. Reed. Space 195.

International Steel Tie Company, Cleveland, O.—Steel railway ties and steel crossing ties. Represented by Wm. P. Day, J. J. O'Donnell, L. C. Shank, George Harpham and W. C. Mahon. Space 292 Armory.

Iowa Gate Company, Cedar Falls, Ia.—Right of way and stock yard gates (metal). Represented by Jack Hyland, Jos. B. Clay and John H. Meyer. Space 146.

O. F. Jordan Company, Chicago, Ill.—Jordon spreader. Represented by M. J. Woodhull and F. C. Rutan. Space 179.

Johns-Manville Company, H. W., New York, N. Y.—Asbestos smoke jacks, shingles, roofings, passenger and freight car insulation, pipe coverings, boiler lagging, cork insulation, cork tile, waterproofing materials, mastic flooring, packings, sectional conduits, fibre conduits, electrical materials. Represented by J. E. Meek, J. C. Younglove, B. J. Feeney, E. T. Wade, L. L. Cohen, Geo. Christenson, Chas. Craig, F. W. Doty, M. H. Farnsworth, C. D. Folsom, C. W. Gearhart, R. A. Hamaker, L. E. Hassman, W. J. Hennessey, F. J. Horne, P. C. Jacobs, D. L. Jennings, W. H. Lawrence, H. L. Leach, H. T. Morris, C. E. Murphy, H. M. Newell, H. G. Newman, G. A. Nicol, H. B. Sewell, J. H. Trent and H. A. Waldon. Spaces 91 and 110.

Joyce Cridland Company, Dayton, O.—Lifting jacks. Represented by Chas. D. Derby, Geo. W. Llewellyn and Frank I. Joyce. Space 28.

Kalamazoo Railway Supply Company, Kalamazoo, Mich.—A general line of track and railway supplies including motor cars, track drills, light velocipedes, etc. Represented by John McKinnon, D. A. Stewart, C. A. Wallace, W. N. Sidnam, E. R. Martin, H. N. Whipple, E. Hicks and W. Winterle. Spaces 23, 24 and 25.

Kelly-Derby Company, Chicago, Ill.—Pumps, engines, motors, well cylinders, rubber, wire cloth and crucibles. Represented by C. W. Kelly, R. E. Derby, W. L. Berghoffer, S. D. Baldwin, Robert McGowan and J. E. Bond. Spaces 11 and 30.

Kennicott Company, Chicago, Ill.—Working models of water softener and filter. Represented by Cass L. Kenni-

cott, E. J. Flemming, W. D. Hawkins, F. S. Dunham, T. G. Windes, Jr., and Wm. N. Jewell. Space 50.

Kerite Insulated Wire & Cable Company, New York, N. Y.—Kerite insulated wires and cables. Represented by R. D. Brixey, Azel Ames, P. W. Miller, J. W. Young, Joseph A. Renton, B. L. Winchell, Jr., and G. A. Graber. Spaces 60, 61 and 62.

Keuffel & Esser Company of New York, Chicago, Ill.—Drawing materials, measuring tapes, surveying instruments, etc. Represented by Rudolf Link, James J. Carlisle, H. B. Huster, Edw. C. Harris, J. C. Hess and Carl W. Strassburger. Space.

Keystone Driller Company, Beaver Falls, Pa.—Downie deep well pumps and well drilling machinery. Represented by E. O. Eyer and G. R. Conyne. Space 13.

Keystone Grinder & Manufacturing Company, Pittsburgh, Pa.—Portable automatic tool-grinding machines. Represented by Wm. L. Munk, G. H. Hommel and S. S. Newman. Space 291, Armory.

Lackawanna Steel Company, Buffalo, N. Y.—Rails, structural material, cabinets of rolled sections, illuminated views of mills, shops, mines, etc, rail joint splices, hook shoulder tie plates, rail joint plates and Lackawanna steel sheet piling. Represented by C. R. Robinson, E. Armstrong, A. P. Van Schaick, C. H. Hobbs, J. L. Hench, F. E. Abbott and A. H. Weston. Spaces 277, 278 and 279 Armory.

Lehon Company, The, Chicago, Ill.—Waterproof canvas, roofing, insulating papers, sill covers, saturated burlap Represented by Tom Lehon and D. B. Wright. Space 144.

Lidgerwood Manufacturing Company, Chicago, Ill.—Hoisting engines and boilers. Represented by F. B. Knight, G. N. Crawford, W. G. Wilmont, E. C. Reeder and W. R. Elden. Space 206.

Lorain Steel Company, Johnstown, Pa.—Track material, frog crossings, switches of both rolled and cast manganese, switch stands, rail braces and guard rail clamps. Represented by A. S. Littlefield, S. P. McGough, H. H. McDonald, Arthur S. Littlefield, Charles G. Donnell, Carroll Burton, George W. Reese, Wm. Lynam, J. E. Decker, W. W. Kingston and A. L. Verner. Spaces 263, 264, 265 and 266 Armory.

Luitwieler Pumping Engine Company, Rochester, N. Y.—Non-pulsating deep well pump, triplex pump.—Represented by R. J. Bauereisen. Space 181.

Lufkin Rule Company, Saginaw, Mich.—Measuring tapes and rules of every description. Represented by S. B. McGee and F. G. Brown. Space 121.

M. W. Supply Company, Philadelphia, Pa.—Vaughan rail anchors. Represented by David L. Vaughan. Space 163.

McGraw Publishing Company, New York, N. Y.—Copies of the Electric Railway Journal, Engineering Record, Electrical World, Metallurgical and Chemical Engineer, Electric Railway and Lighting Directories, and other special publications. Represented by Hugh M. Wilson, L. E. Gould, E. J. Hunt, Sam Hobson, S. T. Henry, W. E. Keily, E. M. Haas, W. W. DeBerard, F. Nicholas, E. J. Mehren, C. W. Stark, H. L. Fischacher, E. B. Cooke, Henry Barnes and Lyon Gardiner. Space 29.

Burton W. Mudge & Company, Chicago, Ill.—Motor cars for inspection, section and spike driving service; right of way gates. Represented by Burton W. Mudge, Thomas H. Garland, Robert D. Sinclair, A. R. Dyer, Robert M. Smith, Blake C. Howard, George W. Bender, Ira W. Winchell, S. S. Lawson, Clive Hastings, H. L. Goodwin, Lathrop Resseguie, Fred S. Wilcoxen, Royal D. Hawley and A. P. Grenier. Spaces 52, 53, 71 and 72.

C. F. Massey Company, Chicago, Ill.—Reinforced concrete railway supplies such as culvert pipe, battery wells, signal posts, telephone booths, etc. Represented by C. F. Massey, A. Christ, Jr., O. J. West, Chas. Gilman, R. A. Peterson, E. M. Hathaway, T. W. Scott and H. W. Wilder.

Morden Frog & Crossing Works, Chicago, Ill.—Solid and built-up manganese frogs, manganese crossing, manganese switch points, Unity, Security and G. L. M. switch stands, guard rails, guard rail clamps, compromise joints, rail braces, etc. Represented by Irving T. Hartz, Arthur C. Smith, Harry M. Macke, William J. Morden, W. Homer Hartz and B. T. Gibbs. Spaces 238, 239 and 240 Armory.

National Carbon Company, Cleveland, O.—Columbia track batteries types 71 and 73, Columbia dry batteries, Columbia multiple batteries, Columbia blue label flashlight batteries and flash lights. Represented by M. H. Moffett, Chas. S. Pflasterer, W. O'Connor and L. W. Fisher. Space 152.

National Concrete Machinery Company, Madison, Wis.—National Concrete fence posts. Represented by Victor E. Rogers and W. L. Casady. Space 221.

National Corrugated Culvert Company, Middletown, O.—Corrugated culverts and flumes. Represented by G. F. Ahlbrandt and Paul T. Defrees. Spaces 99 and 100.

National Electric Specialty Company, Toledo, O.—"Vac-M" (Vacuum) lightning arresters, Signal types No. 1 and No. 2 for automatic block signal work and police and fire alarm telegraph. Giant type for telephone and train dispatching; high tension transmission telephone lines, and toll lines. Telephone exchange type for ordinary subscribers' stations and local lines. Also Paragon ground cones. Represented by F. S. Chapman, V. A. Chapman, J. T. Greene, C. F. Wall and P. H. Chapman. Space 164.

National Indicator Company, Long Island City, N. Y.—Train indicators, station indicators, train departure bulletins, gate signs. Represented by J. Hutchinson and T. M. Wilders. Space 21.

National Lock Washer Company, Newark, N. J.—Nut-locks and testing appliances. Represented by John B. Seymour, Alvin T. Thompson, Chas. P. Williams and A. H. Handlan, Jr. Space 285 Armory.

National Malleable Castings Company, Cleveland, O.—Tie plates, rail braces, anti-rail creepers and bridge washers. Represented by C. L. Johnston, Chas. H. McCrea, J. J. Byers, H. J. Hiatt, L. W. De Witt and T. W. Ashton. Space 105.

George P. Nichols & Bro., Chicago, Ill.—Electrical turntable tractor. Represented by George P. Nichols, Samuel F. Nichols, R. M. Gustonand and Henry Fries. Space 173.

Northey-Simmen Signal Company, L't'd, Indianapolis, Ind.—Apparatus for automatically drawing a graphic train chart in dispatcher's office; cab signal apparatus. Represented by F. Erichsen Brown, P. J. Simmen, C. E. Chatfield and Ed Moore. Spaces 228, 229, Armory.

Ogle Construction Company, Chicago, Ill.—Model coaling station and hoisting machine. Represented by R. A. Ogle, C. F. Bledsoe, E. G. Wendel and Otto Albertz. Space 15.

Ohio Post Mold Company, Toledo, O.—Molds for cement fence posts. Represented by Asa M. Smith and E. S. Smith. Space 202.

Okonite Company, The, New York City, N. Y.—Okonite wires and cables of all kinds, Okonite and Manson tapes, Candee pot heads. Represented by Lewis G. Martin, J. D. Underhill, W. G. Hovey, J. M. Lorenz, R. H. Baker and H. Cox. Space 16.

O'Malley-Beare Valve Company, Chicago, Ill.—Multiplate valves. Represented by Edward O'Malley, Thomas O'Malley and H. A. Crews. Space 18.

Spencer Otis Company, Chicago, Ill.—Economy steel tie plates, Kron automatic springless scales. Represented by H. H. Hart, W. I. De Remer, T. W. Blatchford, Hunter Micheals and Olever Oleson. Spaces 122, 141, 142, 143.

Otto Gas Engine Works, Chicago, Ill.—Otto kerosene engine. Represented by W. Y. Shaw and D. S. Faulkner. Space 186.

The P. & M. Company, Chicago, Ill.—The P. & M. rail anticreeper, bond wire protector, Crane guard rail retainer and the Smith tie renewer. Represented by Philip W. Moore, L. W. Kent, Alvar R. Sutter, Geo. E. Johnson, David T. Hallberg, John Ritchie, R. Harris, J. Edgar Johnson, Royal D. Hawley, Robert J. Mercur and Fred. A. Preston. Spaces 123 and 124.

W. W. Patterson Company, Pittsburgh, Pa.—High grade, hand made tackle blocks. Represented by W. W. Patterson, Jr. Space 147.

C. F. Pease Company, Chicago, Ill.—Automatic blue printing and direct blue line printing machines, paper coating machines, motor driven trimming tables, etc. Represented by C. F. Pease, P. M. Morgan, T. K. Murney, E. R. Thompson and L. M. Campbell. Spaces 157 and 158.

Pennsylvania Steel Company, Philadelphia, Pa.—No. 30 Manard anvil face frog dies, 160 32'; No. 20 Manard anvil face frog; No. 18 Manard anvil face frog; No. 16 Manard anvil face frog; No. 10 solid Manard frog; No. 10 spring rail frog with rolled Manard stiff rail; 30-ft switch complete having rolling Manard switch points; No. 10 Manard spring rail frog main line switch stands, low Steelton positive switch stand; low New Century switch stand with detector attachment; intermediate New Century switch stand with semaphore attachment; intermediate New Century switch stand; drop tests of joints, using iron, steel and Mayari steel bolts; drop tests of open hearth rails. Represented by G. S. Vickery, G. W. Parsons, C. A. Alden, C. A. Langdon, W. H. Allen, F. H. Ogden, W. H. Philler, W. M. Henderson, John C. Jay, Jr., C. S. Clark, R. E. Belknap, R. W. Gillespie, R. W. Reed, N. E. Salsich, J. G. Miller and R. C. Hoffman, Jr. Spaces 241, 242, 243, 244, 253, 254, 255 and 256 Armory.

Pocket List of Railroad Officials, New York, N. Y.—Pocket List of Railroad Officials. Represented by J. Alexander Brown, Chas. L. Dinsmore and Harold A. Brown. Space 26.

Positive Rail Anchor Company, Louisville, Ky., and Marion, Ind.—Rail anchors. Represented by W. M. Mitchell, John C. Haswell and R. H. Johnson. Space 177.

Potter Winslow Company, Chicago, Ill.—Railway supplies in concrete. Represented by G. H. Macdonaugh and A. C. Hudelburg. Spaces 175 and 176.

Protective Signal Manufacturing Company, The, Denver, Colo.—A railroad highway crossing signal, annunciator for tower service; telephone selector. Represented by W. C. Neahr and D. B. Turner. Space 203.

Q. & C. Company, The, New York, N. Y.—Bonzano rail joints, Vaughan rail anchors, Bonzano rolled steel compromise joints, guard rail clamps, insulated rail joints, Samson rail benders. Represented by C. F. Quincy, F. F. Kister, T. B. Bowman, J. A. Wescott, E. M. Smith, H. A. Hawes, C. D. Walworth, J. A. Bodkin, A. R. Horn, W. A. Duckworth, J. J. Qcinn and A E. Stokes. Spaces 120 and 139.

Rail Joint Company, The, New York, N. Y.—Continuous Weber and Wolhaupter rail joints. Represented by L. F. Braine, Percy Holbrook, Benj. Wolhaupter, W. E. Clark, U. C. Armstrong, Fred L. Poor, H. C. Holloway, Geo. C. Isbester, Sumner Collins, E. L. Van Dressar, E. A. Condit, Jr., W. A. Chapman, J. G. Miller, R. W. Smith, W. S. Boyce, C. B. Griffin, Frank M. Hill and Chas. Jenkinson. Spaces 81 and 82.

Railroad Supply Company, Chicago, Ill.—Tie plates, derailers, high crossing alarms, electric signals and signal supplies. Represented by M. J. Comerford, R. D. Hawley, P. F. Hawley, F. C. Webb, H. M. Buck, Geo. M. Kenyon, A. H. Smith, E. H. Bell and E. W. Vogel. Spaces 85 and 104.

Railway and Engineering Review, Chicago, Ill.—The Railway and Engineering Review, a weekly magazine devoted to railway and engineering subjects. Represented by Willard A. Smith, Harold A. Smith, R. S. Richardson, C. L. Bates, A. E. Cherrifield. W. M. Camp and Robert R. Greig. Space 64.

Railway List Company, Chicago, Ill.—Railway publications. Represented by W. E. Magraw, C. S. Myers, L. F. Wilson, K. L. Van Auken, J. M. Crowe, Dalton Risley and W. R. Toppan. Space 9.

Railway & Traction Supply Company, Chicago, Ill.—Hercules steel bumping posts, Wyoming track sander, Wyoming vestibule curtain release. Represented by W. S. Barbee and E. C. Holmes. Space 274, Armory.

Ramapo Iron Works, Hillburn, N. Y.—Switch stands, switches, frogs, guard rail clamps, special switch slide plates, etc. Represented by J. Edgar Davidson, Wellington B. Lee, Arthur Gemunder, James B. Strong and W. C. Kidd. Spaces 280, 281 and 282 Armory.

Reliance Manufacturing Company, Massillon, O.—Nut locks. Represented by Howard J. McGinn, A. W. Carpenter and Frank C. McLain. Space 180.

The Remington Oil Engine Co., New York City, N. Y.—Ten-horsepower kerosene oil engine and duplicate parts. Represented by Frank W. Chaffee and A. L. Abbott. Space 172.

Rhineland Machine Works Company, New York, N. Y.—Ball bearings. Represented by D. D. Davis and Elmer Hendrickson. Space 227 Armory.

Richards-Wilcox Mfg. Company, Aurora, Ill.—Railroad door hangers, parallel door hardware, Underwriters' fire door hardware and grindstones. Represented by E. J. G. Phillips, W. D. Jameson, A. J. Eggleston. Spaces 187 and 188.

Roadmasters' & Maintenance of Way Association, Sterling, Ill.—Booth for the reception of visiting roadmasters and supervisors. Represented by L. C. Ryan, W. A. Kannally, Harry Clark and A. M. Clough. Space 288 Armory.

Roberts & Schaefer Company, Chicago, Ill.—Photographs of Holmen reinforced concrete and frame constructed locomotive coaling stations. Represented by Clyde P. Ross, W. B. Ouard, E. E. Barrett and J. S. Shannon. Spaces 97 and 98.

Sanitary Bunk Company, Indianapolis, Ind.—A sanitary double deck steel spring bunk. Represented by L. H. Mummert. Space 174.

Sellers Manufacturing Company, Chicago, Ill.—Sellers anchor bottom wrought iron tie plates and Sellers wrought iron angle bars. Represented by J. M. Sellers, R. A. Van Houten and G. M. Hogan. Space 125.

Signal Accessories Company, New York, N. Y.—Signal material. Represented by F. C. Lavarack and C. H. Burt. Space 118.

Simmons-Boardman Publishing Company, New York, N. Y. and Chicago, Ill.—The Railway Age Gazette, Maintenance of Way Daily, The Signal Engineer and American Engineer. Represented by Edward A. Simmons, Samuel O. Dunn, Lucius B. Sherman, Henry Lee, Roy V. Wright, John N. Reynolds, Frank S. Dinsmore, H. H. Marsh, Arthur E. Hooven, E. T. Howson, R. E. Thayer, A. D. Cloud, H. H. Simmons, Harold F. Lane, F. H. Thompson, C. W. Garrison, Kenneth G. Cloud, Harold D. Horton, L. G. Dennison and T. E. Crossman. Spaces 44 and 63.

Snow Construction Company, T. W., Chicago, Ill.—Screw spike car, Snow oil crane, Snow bucket type coal chutes and Snow water crane, Johnson water tank lug, Dupree water tank lug, Hess artesian well cylinder, Crescent oil engine. Represented by T. W. Snow, R. E. Gurley, M. D. Miller and R. A. Blake. Spaces 45 and 46.

Southern Railway Supply Company, St. Louis, Mo.—Saunders corrugated car stopper. Represented by W. D. Achuff. Spaces 170 and 171.

Standard Asphalt & Rubber Company, Chicago, Ill.—"Sarco" No. 6 waterproofing and other "Sarco" asphalts for various purposes, including practical illustrations of methods of application, etc. Represented by Norman Malcolm, C. V. Eades, R. E. Kartrock, J. M. Woodruff, G. Schomburg, W. A. Hewey, H. J. Smith and T. P. Stypzynski. Space 1.

Standard Underground Cable Company, Pittsburgh, Pa.—Railway signal wire in all forms. All copper and Colonial copper clad, both bare and insulated; underground cable and cable terminals. Represented by J. R. Wiley, H. P. Kimball, A. A. Anderson, W. M. Rogers, Russell E. Green, J. L. Lyon and Elbert F. Norton. Space 137.

Stark Rolling Mill Company, The, Canton, O.—Flat sheets, roofing, culverts and drains made of anti-corrosive Toncan metal. Represented by A. T. Enlow, J. T. Hay and D. B. Coey. Space 14.

Steel Railway Tie and Appliance Company, Denver, Colo.—Shane steel railway tie and safety fastener. Represented by George H. Shane, Robert E. Foresman, George F. Kiser, A. H. Williams and Bert F. Kiser. Space 196.

Templeton, Kenly & Company, Ltd., Chicago, Ill.—Simplex car and track jacks. Represented by Alfred E. Barron, Arthur C. Lewis, Charles A. Crane, Jr., Lionel B. Morton, Harry M. Hood and Walter B. Templeton. Spaces 31, 32, 33 and 34.

Titanium Alloy Manufacturing Company, Niagara Falls, N. Y.—Samples of Titanium products. Represented by H. H. Cook, Charles Vickers and J. M. Sherrerd. Spaces 283 and 284 Armory.

Toledo Pipe Threading Machine Company, Toledo, O.—Pipe threading and cutting tools. Represented by W. W. Vosper, S. S. Thornberry and R. H. Irwin. Space 178.

Union Draft Gear Company, Chicago, Ill.—Draft gear. Represented by J. R. Cardwell, L. I. Canfield, J. W. Hathaway, W. G. Krauser and J. E. Tarelton. Space 109.

Union Iron Works, Hoboken, N. J.—Pile hammers and derrick excavators. Represented by M. S halscha and W. G. Schalscha. Space 200.

Union Switch & Signal Company, Pittsburgh, Pa.—Mechanical, electro-mechanical, electric and electro-pneumatic interlockings, automatic block signals (A. C. and D. C.), Keystone insulated joints and other signal accessories. Represented by S. G. Johnson, G. A. Blackmore, W. H. Cadwallader, J. S. Hobson, L. F. Howard, J. P. Coleman, H. W. Griffin, H. A. Wallace, T. H. Patenall, J. W. White, J. J. Cozzens, W. W. Talbert, Aaron Dean, M. D. Hanlon, W. E. Corey, H. McCready, A. C. Livermore, E. R. Coe, W. P. Newbert. Spaces 40, 41, 42 and 43.

Universal Metallic Tie Company, Salt Lake City, Utah.—Metal railroad crossties. Represented by Burton S. Rupp. Space 197.

Verona Tool Works, Pittsburgh, Pa.—Track tools and nut locks. Represented by W. H. Remmel, Henry Fischer, E. Woodings, Rex Gray and James C. Barr. Space 129.

Western Electric Company, Chicago, Ill.—Railroad telephone, selectors, arc lamps. Represented by E. W. Hamlin, J. O. Kich and G. H. Porter. Space 17.

Wm. Wharton, Jr., & Company, Inc., Philadelphia, Pa.—Manganese steel frogs and crossings, split switches, switch stands, guard rail clamps, enlarged photographs, models, etc. Represented by Victor Angerer, L. R. Ashhurst, Jr., A. E. Borie, George R. Lyman, R. C. McCloy, H. F. McDermott, W. McLain, J. C. Robinson, W. S. Stothoff and L. W. Jones. Spaces 247, 248, 249 and 250 Armory.

White Enamel Refrigerator Company, St. Paul, Minn.—Full sized section of refrigerator car showing Bohn patented all steel collapsible bulkheads, hatch ventilators and plugs. Represented by A. D. Thomsen. Space 208.

Winans Improved Patented Rail Joint Company, Portland, Ore.—Rail joints. Represented by A. Winans. Space 8.

U. S. Wind Engine & Pump Co., Batavia, Ill.—Water col-

umns, water tanks, steel frames for water tanks, switch stands, semaphores, pumps and pumping machinery. Represented by L. E. Wolcott, C. E. Ward and J. P. Prindle. Space 111.

Wolfe Brush Company, Pittsburgh, Pa.—Railroad paint brushes, railroad brooms and railroad cleaning brushes. Represented by C. N. Struble, W. T. Hogan and W. G. Lange. Space 10.

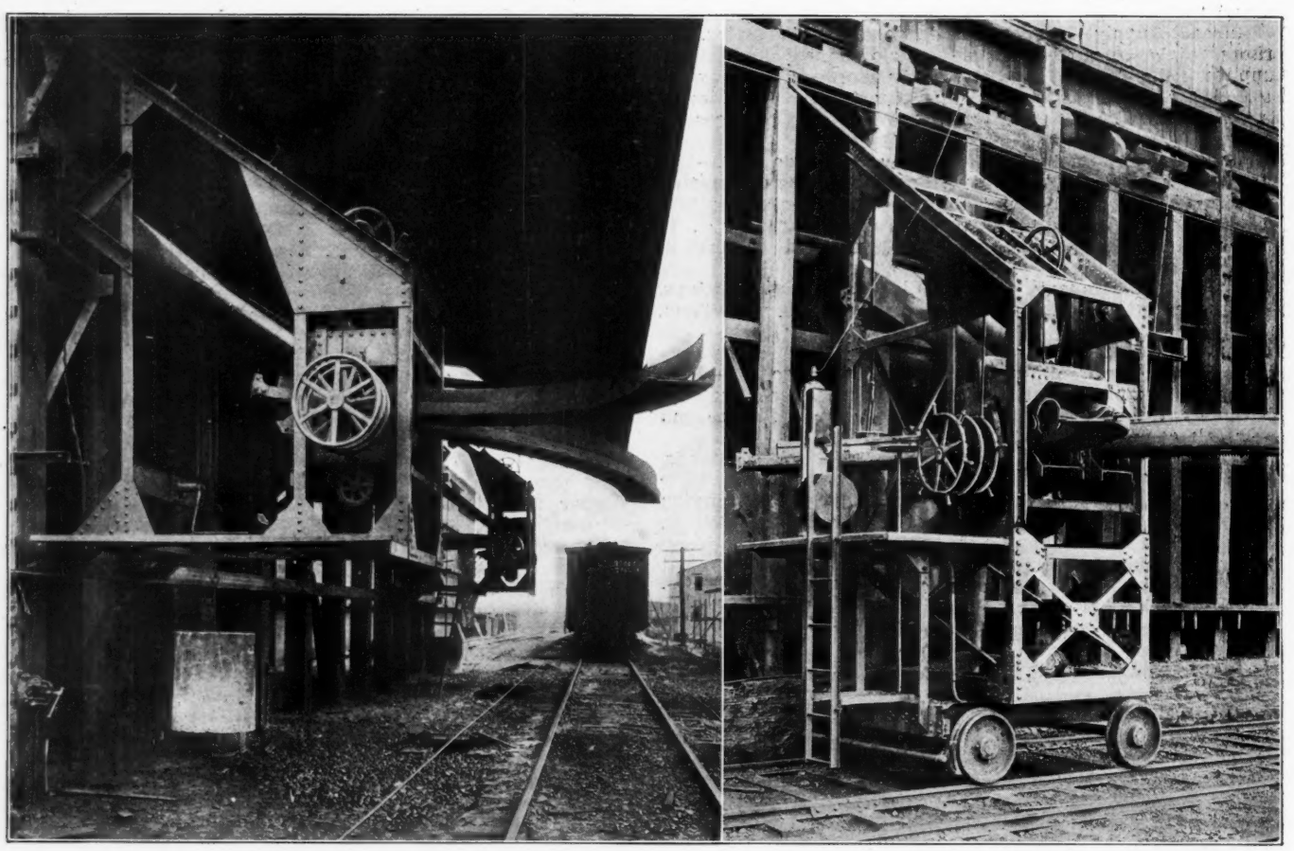
Worth Wire Works, Kokomo, Ind.—Cinch fence stays for right-of-way fences. Represented by O. H. Buck, Timothy Harrison, Forest Craig, H. D. Buck and H. L. Green. Space 210.

Wyoming Shovel Works, Wyoming, Pa.—Track shovels and locomotive scoops. Represented by G. E. Geer. Space 160.

A NEW BOX CAR LOADER.

A new machine for loading anthracite coal into box cars has been developed by Fairbanks-Morse & Co., Chicago, which has been very extensively tried out experimentally, and is now in service at three points. The machine could probably also be adapted to the loading of bituminous coal, coke or similar substances, although as yet no installations for these purposes have been made. The supporting carriage is designed to travel either on its own rails or to be suspended from the structure of the bin it serves. The carriage is of steel with an operating platform suspended on one side at a height which allows the operating levers to be readily handled. The essential feature of the loader is the use of two horizontally curved spouts which receive the coal from two discharge pipes leading from the lip screens of the loading pocket and discharge it in the car, the point of discharge being governed by the distance which the spouts are pushed into the car. These chutes are bronze-lined to reduce the friction, and it has been found that the coal acquires a sufficient velocity in the down spouts to carry it to the ends of the horizontal chutes.

The chutes are supported on a carriage which is capable of vertical movement within the supporting carriage, allowing the chutes to be regulated for the various heights of box cars in use. After this height is adjusted to suit the door of the car, the spouts are extended into the door until their ends are about 25 ft. apart, and as the loading proceeds the spouts are withdrawn, keeping their ends just clear of the pile. The loader may be operated entirely by hand or entirely by electric motor, or by a combination of hand and electric power. The machine shown in the accompanying photograph is propelled from one discharge chute to another by an electric motor and the movement of the chutes is accomplished by hand through the operation of three wheels, shown in the foreground. One of these wheels raises and lowers the chutes to suit the height of the car doors, the second controls the movement of the spouts in and out of the car, and the third tilts the spouts to control the velocity with which the material leaves their ends. All moving parts are carefully counterbalanced so that very little power is required to adjust them, one man being able to handle the whole machine readily. So far as is known, the capacity of the machine is limited only by the capacity of the lip screens which deliver the material from the storage pockets. The ordinary loading rate with this loader is six to eight minutes for a 40-ton car.



New Box Car Loader with Two Types of Carriage.

EXCURSIONS FOR FRIDAY.

While Friday is reserved by the Association for visiting the Exhibition at the Coliseum and Armory, it is probable that some members will find ample time to see the exhibits before Friday and would like to see some points of local interest about the city on that day. If such members will communicate their desire to the arrangements committee, of which F. R. Coates is chairman, parties can be arranged.